

Bement, Miles & Co.,

DESIGNERS AND BUILDERS OF

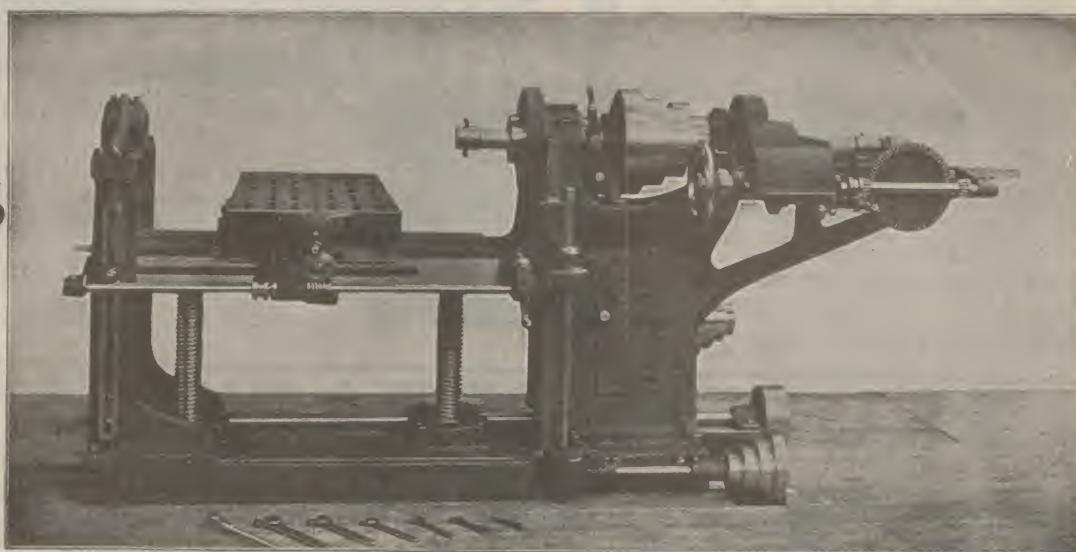
Machine Tools

STEAM HAMMERS, Hydraulic Machinery.

PHILADELPHIA, PA.

Chicago Office: 1534 Marquette B'l'd'g.

New York Office: 39 Cortlandt St.

No. 1. HORIZONTAL BORING AND DRILLING MACHINES.
Swing, 66''—We Build Several Similar Machines of Larger Sizes.

BRANCHES:
NEW YORK, PITTSBURGH.
PHILADELPHIA.
CHICAGO. BOSTON.

When writing please mention this paper.

Charles Scott Spring Company,

Office: 1028 New Market street. Works: Germantown ave, New Market and Canal streets.
PHILADELPHIA, PA.



Manufacturers of
Springs for Railroad Cars and Locomotives.

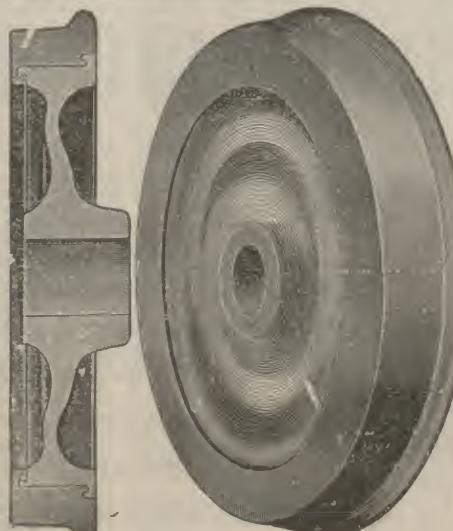
THE BOIES STEEL WHEEL CO.
SCRANTON, PA.

MAKERS OF

STEEL TIRED Railway Wheels

No. 2 Forged Wrought Iron Centers with Steel Tire fastened by the Boies Integral Tire Lock, the strongest fastening known, or any desired fastening. Only TWO PARTS, the practically Indestructible Center; the Steel Tire easily replaced in any Railroad shop. The Forged Iron Center is a permanent and profitable investment.

First class Medal and Diploma at World's Columbian Exposition, "For EXCELLENCE of Design, Material and Workmanship in Steel Tired Wheels."



This is a PARTIAL List of what we Build:

Engine Lathes.
Shafting Lathes.
Heavy Forge Lathes.
Driving-wheel Lathes.
Lathes for turning steel-tired car-wheels.
Lathes for turning printing-press cylinders.
Single Axle-lathes.
Double Axle-lathes.
Planing Machines for general work.
Planing Machines for frogs and split-switches.
Planing Machines for connecting-rods.
Plate-planing Machines.
Double Plate-planing Machines.
Shaping Machines.
Slotting Machines.
Slotting Machines for heavy forge work.
Slotting Machines for locomotive-frames.
Screw Machines.
Vertical Drilling Machines.
Radial Drilling Machines.
Arch-bar Drilling Machines.
Multiple Drilling Machines for special purposes.
Multiple Drilling and Tapping Machines.
Car-wheel Drilling Machines.
Horizontal Boring and Drilling Machines.
Horizontal Boring, Drilling and Milling Machines.
Pulley boring Machines.

Vertical Turret-boring and Turning Machines.
Chord-boring Machines.
Cylinder-boring Machines.
Cylinder and Valve-port Boring Machines for Corliss Cylinders.
Double Boring Machines for duplex pumps.
Car-wheel Boring Machines.
Boring and Turning Mills.
Boring and Turning Mills for steel tires.
Boring and Turning Mills with extensible housings.
Hydrostatic Presses for locomotive-drivers and car-wheels.
Hydrostatic Forcing Presses for shafts and similar work.
Quartering and Crank-pin Machines for locomotive-drivers.
Cutting-off Machines.
Double Cutting-off and Centering Machines.
Plate-bending Rolls for sheet, tank and boiler work.
Plate-bending Rolls for ship plates.
Vertical Bending Rolls for armor plates.
Plate-straightening Machines.
Shaft-straightening Machines.
Pipe Cutting-off Lathes.
Retaining-ring Bending Rolls.
Car-wheel Plate Lathes, Etc., Etc., Etc.

THE BUCKEYE AUTOMATIC CUT-OFF ENGINE

15 to 2,000 H. P. For all Purposes.



BUCKEYE ENGINE CO., 20 Franklin Ave., Salem, O.

39-41 Cortlandt St., New York City; W. L. Simpson, 5th and Buttonwood Sts., Philadelphia, Pa.; 509 Tradesman's Bank Bldg., Pittsburgh, Pa.; 403 Neave Bldg., Cincinnati, O.; 1249 Marquette Bldg., Chicago, Ill.; J. P. Creighton, 323 W. Main St., Louisville, Ky.; Robinson & Cary Co., St. Paul, Minn.; A. L. Fish, 59 1st St., San Francisco, Cal.; 415 John Hancock Bldg., Boston.

THE ACME MACHINERY CO.

Cor. St. Clair and Hamilton Sts.
CLEVELAND, OHIO.

MANUFACTURERS OF

ACME BOLT AND RIVET HEADERS.

Acme Single and Double
Automatic Bolt Cutters.
Cutting from $\frac{1}{2}$ in. to 6 in. diameter.

Also Separate Heads and Dies.

Pat. Dec. 5, '82
Pat. Dec. 4, '83
Pat. Aug. 25, '85

Manufacturers of CARS,
For Every Kind of Freight Service.
CAR WHEELS.
Cast in Contracting Chills.

Sole Manufacturers in the United States of RUSSELL SNOW PLOWS.
F. B. CANDA, Pres. O. J. CANDA, Vice Pres. J. W. SAVIN, Gen'l Agent.
11 Pine St., NEW YORK. E. ENSIGN, Sec'y and Treas. HUNTINGTON, WEST VIRGINIA.

New Steel Freight Cars.

WRITE FOR PARTICULARS TO
PENNOCK BROS., Manufacturers of Railway Freight Cars, MINERVA, OHIO

**THE ASHTON
Muffler Safety Valve**

The only one with outside top regulation for the pop. Always open. Saves valuable time and expense.



Our muffler patents control the top outside pop regulating principle, which gives increased efficiency and durability.

Open Pop Safety Valves and Improved Steam Gages.

The Ashton Valve Co., 271 Franklin Street, Boston, Mass.

PHOENIX CRANES

THE PHOENIX IRON WORKS CO.
MANUFACTURERS OF
Hand, Steam, Belt and Electric Cranes,
ALL STYLES AND FOR ALL PURPOSES.
Railroad Turntables, Etc.

Send for Catalogue. **CLEVELAND, OHIO.**
Eastern Office, Harry W. Jennings, Agent, Fulton and Cliff sts., New York, N.Y.; and New England Office, The John Wales Company, 139 and 141 High st., Boston, Mass.

BRUNER, SPRAGUE & CO.

SOLE SELLING AGENTS FOR

SALL MOUNTAIN ASBESTOS CO.

THE BEST MATERIAL IN THE WORLD

For Fireproofing, Deafening, Insulating,
Lagging, Etc.

MASTER MECHANICS OF RAILROADS for Lagging for Locomotives, Coverings for Boilers and Steam Pipes. MASTER CARBUILDERS for Insulating Refrigerator and Cold Storage Cars, Coaches and Sleeping Cars. SHIP BUILDERS for Insulating and Deafening Cabin Floors, Covering Boilers and Steam Pipes. ARCHITECTS, ENGINEERS AND CONTRACTORS for Fireproofing Insulating Partitions and Deafening Floors.

THE SALL MOUNTAIN ASBESTOS CO. have an Immense Mine of Pure Short Fibre Asbestos, located at Sautee, White county, Ga., and we are prepared to furnish it at prices so low that it can be used in direct competition with Mineral Wool and kindred materials; while at the same time it is far superior in quality and durability, and goes much farther according to the weight.

Write for Prices and Samples to
BRUNER, SPRAGUE & COMPANY,
CHICAGO, ILL. Telephone 195 HARRISON.



IRA DIMOCK, Pres.

ESTABLISHED 1867.

G. H. SERGEANT, Treas.

NORTHAMPTON EMERY WHEEL Co.

MANUFACTURERS OF

Premium Solid Emery

AND

Corundum Wheels,

AND ALL KINDS OF

EMERY WHEEL MACHINERY.

LEEDS, MASS.

WESTERN BRANCH

20 South Canal St., CHICAGO, ILL.



Balance Slide Valve

SIMPLEST, CHEAPEST, most DURABLE.



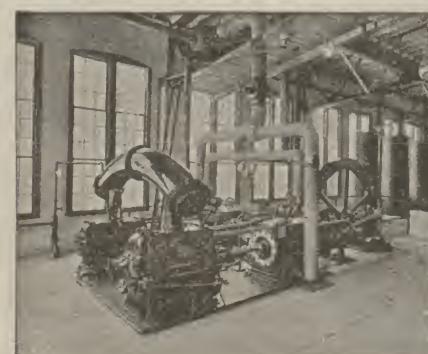
San Francisco,
Cal.

AMERICAN BALANCE
SLIDE VALVE CO.

Jersey Shore
Penn.



**PONTIAC
ENGRAVING & PUB. CO.**
358 DEARBORN ST.
CHICAGO.



IT PAYS

To buy the best, most economical, up-to-date

AIR COMPRESSOR.

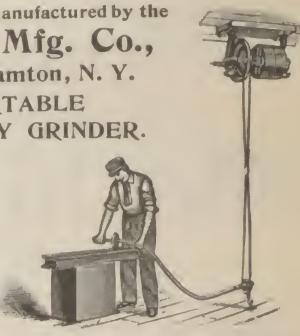
We are building this kind.

RAND DRILL CO.

1328 Monadnock Block, Chicago, 100 Broadway, New York.

Stow Flexible Shaft

Invented & Manufactured by the
Stow Mfg. Co.,
Binghamton, N.Y.
Cut of PORTABLE
EMERY GRINDER.



PORTABLE
DRILLING,
TAPPING,
REAMING,
ETC.

Adam's
"T" Steel Post

For Railroads.

Cheap as Wood. Strong, Durable and the only Practical Steel Post made.

Fitted for Any Wire.

Send for estimates, etc.

W. J. Adam,
Joliet, - Illinois.

CHICAGO TO LOUISVILLE.
The Pennsylvania Line is the shortest
Two trains daily. Ticket Office, No. 284
Clark Street.

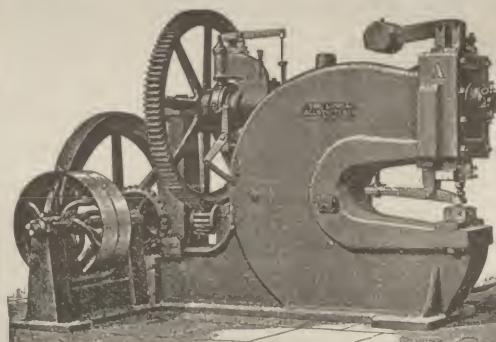
Pick Out

Severest points
on your
line where you
can test
THE
SERVIS TIE
PLATE



Pick out
any other plate
to test in
comparison.
Results
will vindicate
the SERVIS.

THE Q AND C COMPANY,
700-707 Western Union Bldg.
CHICAGO.



Long & Allstatter Co.
HAMILTON, O.

DOUBLE, SINGLE, HORIZONTAL,
BOILER, SPACING GATE, MULTI-
PLE, BELT AND STEAM DRIVEN

PUNCHES
AND
SHEARS.

Send for new Catalogue.
OVER 300 SIZES.

THE BEST LAGGING IN EXISTENCE.
MAGNESIA
LOCOMOTIVE LAGGINGS.

Universally Adopted as the Best Locomotive Lagging Made.

THE KEASBEY & MATTISON CO.,
AMBLER, PA.

The Robert W. Hunt & Co.

Robt. W. Hunt. G.W.G. Ferris & Co.
John J. Cone. A.W. Fiero.

Bureau of Inspection
Tests and Consultation,

1137 The Rookery, Chicago, Ill. Chemical and
Physical Laboratories.

INSPECTION OF RAILS, FISH PLATES,
CARS AND OTHER RAILWAY MATERIAL.

BRANCH OFFICES:
Hamilton Bld., Pittsburgh, Pa.
80 Broadway, New York.
328 Chestnut St., Philadelphia.

R THE RAILWAY REVIEW

No. 42 OCTOBER 17, 1896. XXX.

ELECTRIC TRACTION ON ELEVATED ROADS.—It is stated that preparations are being made for testing the Westinghouse electric traction system on the elevated roads New York. The question whether the electric current could be so perfectly controlled that trains upon an elevated structure could be run, first of all, with the safety which has been characteristic of these roads in the past 15 years, and whether electricity would be as economical as steam, or more so, are believed to have been answered. Tests will be made on one of the smaller branches and afterwards more exhaustive tests on the part of the system north of the Harlem River. A trial made at New York, Monday, on the Manhattan Elevated Railroad was pronounced successful. The system used combines the use of storage batteries and of a third rail charged with the electric current. The third rail is placed just outside one of the wooden beams that serve as a guard to prevent the wheels jumping the rails. It is about four inches above the beam and eight inches above the regular track. The current is supplied from a dynamo, located near by. Two steel shoes take up the electricity from this third rail and carry it to the motor. The running time made is not equal to the steam engines, but this may be due to faults that can be corrected.

HEAT RESISTING PROPERTIES OF PORTLAND CEMENT.—In the "Digest of Physical Test and Laboratory Appliances," Mr. J. S. Dobie gives particulars of the results of a recent investigation of the action of heat on Portland cement. Three different brands were examined, all of excellent quality, but two were of the slow setting class, whilst the remaining one set very rapidly. Over 200 briquettes were prepared, some consisting of neat cement, whilst in other cases 1 part of cement was mixed with 1, 2, or 3 parts of sand. The age of the briquettes ranged from two months to four years. In making the tests they were heated in a gas furnace to a temperature of from 650 deg. to 1775 deg. Fahr. After removal from the furnace every briquette was found to have lost weight, whilst in the case of the neat specimens, cracks were usually to be observed. These latter were less apparent in the case of the other briquettes containing sand. After cooling, the briquettes were tested for tensile strength with a load applied at the rate of 400 lb. per minute. In all cases a marked decrease in the tensile strength was noted, which was apparently closely connected with the loss in weight of the sample. In those cases in which the reduction in weight showed that practically the whole of the water of crystallization had been driven off, the specimens had practically no breaking strength. The effect of different temperatures was, however, peculiar, since briquettes heated rapidly to 1775 deg. Fahr. showed a loss of strength out of proportion to their loss in weight. When, however, the heating was slowly effected, these two losses were closely proportional. After cooling, the briquettes of neat cement could be crumbled to pieces in the fingers, whilst those containing sand, disintegrated spontaneously on standing. Briquettes removed from the furnace and placed in water immediately, cracked and disintegrated, becoming in most cases reduced to a soft mud. From his experiments Mr. Dobie concludes that though Portland cement may, to a certain extent, protect ironwork during a fire, the cement will be ruined, and will break up spontaneously afterwards, while such a concrete covering will be absolutely ruined if water is thrown on it. Even at the lowest temperature used in the experiments the concrete was seriously damaged, and it would appear that a fire of ordinary intensity is sufficient to completely ruin a large covering of concrete.

NOVEL AUTOMATIC BOILER FEEDING DEVICE.—While considerable ingenuity has been displayed by inventors in devising means for automatically maintaining any desired water level in a steam boiler, it cannot be said that any remarkable degree of success has attended the efforts which have been made with this end in view. A very simple plan has been adopted by Messrs. Yarrow (England), which, although at first sight appearing crude and unsatisfactory, is found to give good results in practice. The system consists in feeding each boiler separately by a Worthington donkey pump, and placing the mouth of the steampipe for supplying the donkey close to the water level of the boiler. If the water rises too high it will enter the donkey steampipe and choke the cylinder with water. Then the donkey will almost stop, while if the water level falls, then the donkey will work fast and pump the level up again. It has been found that when the water enters the steam cylinder the pump does not pound in an objectionable manner, as might perhaps be expected, and also that the pump does not stop when the water enters the steampipe, but runs slowly, because the steam cylinder is larger than the water cylinder, the pump actually taking more water out of the boiler than it puts in. A further point to note is that the heat in the water taken from the boiler is not lost, but is returned to it. It is said that in a recent three hours trial of a torpedo boat having this feed regulating device, the valves were not touched once.

OPEN HEARTH PROCESS IN STEELMAKING.—Andrew Carnegie is responsible for the statement that the rapid growth of the openhearth process of steelmaking is chang-

ing the character of the output. Engineers are now all specifying open hearth steel. It is impossible to sell Bessemer steel for bridges, boiler plates, ships, or even for those enormous 22 story steel structures which are going up throughout the country. Open hearth steel is now sold almost, if not quite, as cheaply as Bessemer. This is rendered possible by the lower price of the Mesaba and non-Bessemer ores of Lake Superior than the ores necessary for the Bessemer process, the ores being suitable for open hearth practice. If the movement continues we are likely to see less demand for Bessemer ores, and therefore the tendency will be for the Bessemer and non-Bessemer ores to become equal in price, and this may give the Bessemer steel a slight advantage in the cost. If so, it will continue to be used for billets, and a thousand and one ordinary purposes. But there will still remain a large market for the open hearth variety. So confident is one of the leading concerns in the United States of this that to-day it is erecting sixteen 40 ton open hearth furnaces, having already twenty in operation, so that this concern will have thirty-six open hearth furnaces, capable of producing 90,000 tons of open hearth ingots per month—say about 1,000,000 tons per year. This shows wonderful confidence in the market for open hearth steel. It is but proper to say, however, that this concern has large interests in Mesaba ores, and has also command of very cheap gas coal as well as of natural gas, which is found to be remarkably well adapted for open hearth practice.

RAILWAYS IN GREAT BRITAIN.—The London Railway News, in an article on the British railway system, gives the following figures showing the length of railways, and their cost, together with the business done last year:

Miles of railways, - - - - -	21,174
Capital cost, - - - - -	£1,114,686,000
Passengers carried, - - - - -	929,770,000
Tons of minerals carried, - - - - -	240,365,000
Tons of goods carried, - - - - -	93,865,000
Miles traveled by trains, - - - - -	338,851,000
Receipts from passengers, - - - - -	£37,361,000
Receipts from freight, - - - - -	£44,034,000
Working expenses, - - - - -	£47,876,000
Number of locomotives, - - - - -	18,658
Number of vehicles, - - - - -	677,000

What would our American anti-railroad legislators think of a capitalization averaging \$250,000 per mile?

TEXAS RAILROAD LAWS.—Commissioner J. H. Reagan, one of the projectors of the interstate commerce law, is responsible for the statement that Texas has the best set of railroad laws in the world. In Texas there is no such thing as a railroad rate war. There is no such thing as watered railway stocks, and the assessments of railways are upon the actual value of the property. Although the officers of the roads fought the law bitterly for years, the state was sustained in the courts, and the railway managements have arrived at the conclusion that the laws are best for all concerned. Railroad legislation has done a great deal of good in Texas. The railway commission is empowered to make and maintain freight and passenger rates and to see that there is no discrimination. We aim to make rates that will give a fair return upon the real value of the property, and no more. At the start we tried to institute the mileage basis in the freight and passenger business, but we were obliged to abandon the plan, as the interstate roads refused to co-operate with us. The mileage basis, I am convinced, is the proper principle, but the time has not come in Texas to adopt it. We have group rates and differential rates. We are in favor of the discontinuance of passes by railroads of the state, and have so recommended in our reports from year to year. The roads will not adopt the idea. Mr. Reagan explained the method of valuing railroad property. He said the commission, with the assistance of experts, arrive at the cost of road-bed and improvements, the value of railroad ties, iron, rolling stock, and improvements of various kinds, and sends a complete list of valuations to the headquarters of the roads for consideration of the officers. There has never yet been a contest in the courts over the valuations placed by the commission.

HARBOR WORKS AT CAPE TOWN.—The breakwater and south pier undertaken at Cape Town have now so far advanced as to bring the enclosure of the sixty-four acres constituting the outer harbor within sight of completion. The east pier at the extreme end of the breakwater and the corresponding pier at the extreme end of the south pier are rapidly approaching the point where the work will be finished off so as to allow an entrance of 250 ft. into the harbor. When this has been done a space of eighty acres of still waters will be provided. Upon the south pier upwards of 2,000 ft. of quay wall are finished, while at the elbow the submarine works, which spring from a depth of 33 ft. or 34 ft., have been put in, the masonry being 2 ft. or 3 ft. out of water at high tide. In order to meet the convenience of the commercial interests of Cape Town the Harbor Board has thrown open 800 ft. of quay, and recently a Clan and a Union steamer were able to discharge at one and the same time. There is a depth varying from 27 ft. to 33 ft. along the entire 700 yards of quay, except at a point where the pier springs from the mainland; here a little further excavation is required. A road, 55 ft. wide, is being constructed from end to end of pier on the town side, and this is flanked by a screen wall 12 ft. high on the road side intended to protect passengers from spray cast up by a southeaster. On the right of the center of the pier four sheds, 403 ft. by 60 ft., are about to be erected. A continuous roof will cover these sheds and the wide interspaces between them and the sheds will be so arranged that general cargoes will be protected in every manner possible from the coal which must necessarily be stored in a portion of each shed. Another new

feature of the south pier is a collier jetty, which runs parallel with the pier for a distance of 750 ft. Colliers will discharge at this jetty, thus leaving the west quay in the Alfred Basin free for general merchandise. Between the collier jetty and the pier there will also be a barge jetty, 250 ft. long, where coal will be shipped. At the rear of these two works there will be a number of coal and goods sheds, and a coal depot, so arranged that in the southeast winds coal dust will fly in an opposite direction to the merchandise. For the construction of the south pier 13,000 concrete blocks, each weighing seven tons, have been required, and 12,000 of these have been set. These blocks are made on the spot, and take three months to mature.

A LOFTY RAILWAY VIADUCT.—The most noteworthy feature in connection with the new Prussian State Railway, which is now in course of construction between the industrial centers of Remscheid and Solingen, will be the viaduct spanning the Wupperthal at the little town of Mungsten. When completed the structure will enjoy the distinction of being the loftiest of its kind on the European continent, eclipsing both in height and width of its main arch the celebrated Douro bridge at Oporto. It will, moreover, prove the most costly piece of work hitherto undertaken by the Prussian State Railway department. The total height of the Douro bridge is 62 meters, or about 204 ft., whereas the viaduct at Mungsten will attain an altitude of 107 meters, or about 353 ft. As regards the span of the center arch, the one at Douro measures 160 meters, 525 ft., while that at Mungsten will be 170 meters, 556 ft. Upwards of 1,700 tons of iron work will be required for the principal arch, and the total quantity of iron employed on the viaduct generally will amount to 4,000 tons. Six colossal side pillars will form a support for the remaining portion of the bridge. The piers are already completed, but it will occupy some time yet before the two massive main beams are placed in position, this part of the undertaking being necessarily attended with considerable difficulty. The cost of the viaduct is estimated at 2,500,000 marks or £125,000.

WORKING OF ELECTRIC CRANES.—As an exposition of the working results of the practical operation of electric cranes in iron works over a long period, the paper read last week by Mr. E. W. Anderson before the British Association will prove to be of considerable interest. The paper constitutes a record of experience gained during eight years at the Erith Iron Works of the working of an overhead traveling electric crane of a capacity of 20 tons, as compared with a steam crane of the same lifting power used in the foundry, and of a 15 ton electric crane employed in the main bay of the turnery. The author detailed the various difficulties which were encountered in the working of these electric cranes, and the manner in which they were ultimately overcome in the trying conditions incidental to the atmosphere of the foundry. For the details reference must be made to the paper in question, but it may here be mentioned that under the conditions obtaining at the Erith works, the electric cranes have proved to be more economical than the steam cranes, more convenient and less costly in repairs.

TELEPHONES IN JAPAN.—The Japan Weekly Mail states that the Japanese government, with the consent of the Diet, is to appropriate a sum above 12,800,000 yen, spread over seven years, for the expansion of the telephone service. The work of construction is being now actively carried on at various important places, the present intention being to complete, by March, 1898, the contemplated expansion of the service in so far as concerns Tokyo, Osaka, Yokohama and Kobe, as well as the new constructive work in Nagoya, Nagasaki, Shimonoseki, and so forth, and to establish connection between Tokyo and Kobe. According to estimates for the current fiscal year, the number of new subscribers in the four cities of Tokyo, Yokohama, Osaka and Kobe, under the expanded system, will be 13,333, and of those in Kyoto and thirty-five other places where the service is to be newly established, there will be 6,800. Side by side with the erection of telephones in so many places, the authorities will also effect various junctions between places already furnished with telephones. For instance, a connection between Tokyo and Kobe will be established via Osaka, Kyoto, Yokkaichi, Kuwana and Nagoya. It is feared that this portion of the work may not be completed within the prescribed period.

The Western Society of Engineers.

The Western Society of Engineers met on Wednesday evening, October 7th, in Scientific Hall, Armour Institute Mr. J. J. Reynolds, presiding. Mr. T. L. Condon read a paper on "Steel for Boilers and Fire-boxes," with stereopticon views illustrating and explaining variations as to tensile strength, elastic limit, etc., in the specifications of the Master Mechanic's Association and the steel manufacturers and with reference to the chemical requirements in steel, occupying the close attention of the audience. Mr. H. F. J. Porter, was then introduced and spoke on "Steel Forgings" illustrated from the practice of the Bethlehem Iron Company. He presented stereopticon views of the extensive plant of that company showing the powerful cranes used in handling large ingots of steel while they were being forged by the hydraulic machinery into armor plates and turrets for battle ships, into crank shafts for steam ships, such as the St. Louis and St. Paul, and into large ordnance for the government. The steel was pictured in its various stages of reduction for the different purposes it was designed to be used. Mr. Porter presented a deal of valuable information and had the close attention of his hearers. These papers wi

discussions will appear in the society's journal. The next meeting of the society will be held in its rooms, Monadnock Block, Chicago, Wednesday evening, Oct. 21, 1896, when discussions on these papers will be held, followed by a paper on "Railway Yards and Terminals" by Mr. H. G. Hetzler, of the Chicago, Burlington & Quincy Railroad.

The society will visit the Bedford Stone Quarries of Bedford, Ind., and the works of the Western Cement Company, of Louisville, Ky., on October 16 and 17. The Louisville, New Albany & Chicago Railroad (Monon Route) has very generously tendered free transportation to the society for this trip. The train will leave Chicago, Thursday evening, Oct. 15, returning so as to reach Chicago the following Sunday morning. The party will enjoy the hospitality of the owners of the quarries on Friday and that of the cement company at Louisville on Saturday.

NEW LOCOMOTIVES FOR THE BALTIMORE & OHIO RAILROAD.

Specifications prepared by Mr. Harvey Middleton, general superintendent of motive power of the Baltimore & Ohio Railroad, were used for three types of new locomotives which have been built from the drawings. The first of these is a 21x26 in. consolidation engine, shown in Figs. 1 and 2, of which 25 have been built by the Richmond Locomotive & Machine Works. The following table presents the chief characteristics of these locomotives:

Consolidation type, 21x26 in. cylinders	simple
Simple or compound	
Total wheel base	23 ft. 2 in
Wheel base, rigid	15 ft 2 in
Total wheel base of engine and tender	51 ft 2 in
Total length of engine and tender over all	64 ft 7 in
Diameter of cylinders	21 in
Stroke of piston	26 in
Diameter of piston rods	3 1/8 in
Size of steam ports	18x1 1/8 in
Size of exhaust ports	18x3 in
Greatest travel of slide valves	5 3/8 in
Outside lap of slide valves	3/4 in

The diagram shown in Fig. 3 gives the chief dimensions of the ten 22x28 in. consolidation engines built by the Cooke Locomotive & Machine Company. These are also simple engines, and their general details are given in the following table:

Consolidation type, 22x28 in. cylinders.	
Total wheel base	23 ft. 2 in
Rigid wheel base	15 ft
Total wheel base of engine and tender	51 ft. 7 in
Total length of engine and tender over all	61 ft. 3 in
Diameter of cylinders	22 in
Stroke of piston	28

Kind of horizontal seams	Butt with double welt
Kind of circumferential seams	Double riveted
Material of tubes	Iron
Number of tubes	248
Outside diameter of tubes	2 1/4 in
Length of tubes over tube sheets	14 ft. 9 in
Inside length of fire-box	115 in
Inside width of fire-box	41 in
Depth of fire-box from crown sheet to bottom of mud ring, front	69 7-16 in
back	67 3-16 in
Water spaces, sides and back	3 in
Water spaces, front	4 in
Crown stayed with	Crown bars
Diameter of dome, inside	30 in
Height of dome	24 in
Steam pressure, pounds	180
Kind of grate	Rocking
Grate surface, square feet	37.75
Heating surface of fire-box, square feet	182.5
Heating surface of tubes, square feet	2,155.0
Total heating surface, square feet	2,337.5
Height from top of rail to top of smoke stack	14 ft 7 in
Tires	Standard Steel Co.'s
Guides and cross heads	Guides steel, cross heads steel, alligator style
Connecting rods	channeled bodies
Brakes	Westinghouse, American driver brakes
Lubricators	Nathan triple
Injectors	Monitor No. 10
Valves	Richardson balanced
Gages	8 1/2 in. Crosby
Springs	Pickering
Headlight	Kelly 18 in. with B. & O. frame for numbers
Special devices	Coale 3 in. muffed safety valves
Tender.	
Wheels	33 in. chilled
Axes	steel
Size of axle journals	4 1/4 x 8 in
Water capacity of tank, gals	4,000
Frames, wood or metal	Wood
Brake beams	National Hollow
Brake heads and shoes	Christie

The designs previously shown are for freight service and accompanying them are ten of the ten wheel single expansion type for passenger service which were built by the Baldwin Locomotive Works, a diagram of the design being shown in Fig. 5, and a general view in Fig. 4 which is reproduced from a photograph. The driving wheel base of these engines is short on account of the sharp curves over which they will run. The driving wheels are 68 and 78 in. diameter and the rear axle is under the middle of the fire-box which is of the "toboggan" type and is placed on top of the frames. The boilers have radial stays. This order was made in two parts the dimensions for which are indicated in the table: Fig. 4 shows one of the engines with 78 in. driving wheels. Number ordered, 6 single, 4 expansion. Total wheel base, 24 ft. 6 in., 24 ft. 6 in. Rigid wheel base, 13 ft. 8 in., 13 ft. 8 in. Total wheel base of engine and tender, 51 ft. 8 1/4 in., 51 ft. 8 1/4 in. Total length of engine and tender over all, 61 ft. 9 in., 61 ft. 9 in. Diameter of cylinders, 21 in., 20 in. Stroke of piston, 26 in., 26 in.

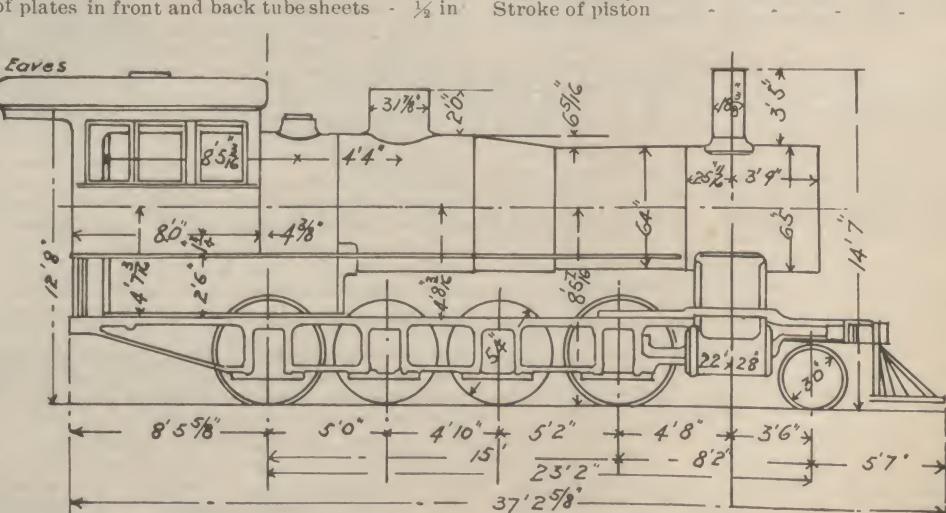


FIG. 3.—DIAGRAM OF COOKE, CONSOLIDATION LOCOMOTIVE.



FIG. 1.—CONSOLIDATION LOCOMOTIVE—BALTIMORE & OHIO RAILROAD.

Lead of slide valves in full stroke	0 in
Diameter of driving wheels outside	50 in
Kind of truck wheels	Standard plate, steel tired
Diameter of truck wheels	30 in
Size of driving axle journals	7 1/2 x 9 in
Size of truck axle journals	5 1/2 x 8 1/4 in
Size of main crank pin journals	5 3/4 x 5 1/2 in
Description of boiler	Crown bar, wagon top
Diameter of boiler at smallest ring	60 in
Material of boiler	steel
Thickness of plates in boiler barrel	9-16 and 5/8 in
Thickness of plates in fire-box shell	9-16 in
Thickness of plates in sides, back end and crown of fire-box	5/8 in. and 7-16 in
Thickness of plates in front and back tube sheets	5/8 in
Kind of horizontal seam	double riveted butt
Kind of circumferential seams	double riveted lap
Material of tubes	charcoal iron
Number of tubes	221
Diameter of tubes, outside	2 1/4 in
Length of tubes over tube sheets	13 ft. 8 in
Length of fire-box, inside	10 ft
Width of fire-box, inside	34 3/8 in
Depth of fire-box from crown sheet to bottom of mud ring, front	6 ft. 10 1/2 in., back 5 ft. 11 in
Water spaces, sides and back	3 in
Water spaces, front	4 in
Crown plate stayed with	crown bars
Diameter of dome	31 in
Height of dome	22 in
Steam pressure, pounds	165
Kind of grate	Rocking bar
Grate surface	28.64 sq ft
Heating surface of fire-box	173 sq ft
Heating surface of tubes	1779 sq ft
Total heating surface	1952 sq ft
Height from top of rail to top of smoke stack	14 ft 3 1/2 in
Tires, kind and make	4 flanged, 4 plain Midvale
Guides and cross-heads, type and metal	two-bar steel, H cross-head
Connecting rods	steel
Brakes	Westinghouse; American driver brakes
Lubricators	Nathan triple sight feed
Injectors	Monitor No. 10
Valves	Richardson balanced
Gages	Ashcroft
Springs	A. French Spring Co.'s
Headlight	Rochester Headlight Co.; B. & O. standard
Special devices	Leach's sanding device; asbestos cement lagging

Diameter of piston rods	3 $\frac{1}{2}$ in., 3 $\frac{1}{2}$ in
Size of steam ports	19x1 $\frac{3}{8}$ in., 19x1 $\frac{3}{8}$ in
Size of exhaust ports	19x2 $\frac{1}{4}$ in., 19x2 $\frac{1}{4}$ in
Greatest travel of slide valves	6 in., 6 in
Outside lap of slide	1 in., 1 in
Lead of slide valves in full stroke	3-32 in., 3-32 in
Diameter of driving wheels, outside	78 in., 68 in
Kind of truck wheels	wrought center, wrought center
Diameter of truck wheels	33 in., 30 in
Size of driving axle journals	8x10 in., 8x10 in
Size of truck axle journals	5x10 in., 5x10 in
Size of main crank pin journals	6x6 in., 6x6 in
Description of boiler	wagon top, wagon top
Diameter of boiler at smallest ring	60 in., 60 in
Material of boiler	steel, steel
Thickness of plates in boiler barrel	$\frac{5}{8}$ in., $\frac{5}{8}$ in
Thickness of plates in fire-box shell	9-16 in., 9-16 in
Thickness of plates in sides, back end and crown of fire-box, $\frac{3}{8}$ in., 7-16 in., $\frac{3}{8}$ in., 7-16 in.	
Thickness of plates in front and back tube sheets	$\frac{1}{2}$ in., $\frac{1}{2}$ in

Frames, wood or metal	wood, wood
Brake beams, kind and make	National Hollow, 2 $\frac{1}{2}$, 2 $\frac{1}{2}$
Brake heads and shoes, kind and make, malleable head	
	cast iron shoe

We are indebted to Mr. Harvey Middleton for the diagrams and information pertaining to these locomotives which show interesting tendencies in respect to the ample dimensions of heating surface, large cylinders and steam passages and to the long stroke of the pistons. It will be noticed in the tables that the freight locomotives have crown bar staying for their fire-boxes and that the ten-wheel passenger design employed radial staying. The service which these locomotives are to be given varies greatly and in these three, or rather four locomotives, an example is seen showing that the necessity of

Scrap Heap of Experience and Recollection."

I need not recite to you the tribulations of a general passenger agent in his business experience; they are familiar to you all in your practical everyday railway life. But I am going to tell you of some of the trials a general passenger agent has had in endeavoring to select a subject for a speech, and in trying to reach a conclusion as to what he should say and how he should say it. I may give you some unwelcome advice, but you must stand it. You appointed me to the duty of "talking" to you, and I warn you that you are now, at this moment, being punished for it.

Every man should know himself, and I know myself so well that I have no hesitancy in acknowledging my incompetence and unfitness to say to you anything that shall be either entertaining or instructive. My ambition would be, and had I the ability to do so I would fill this "talk" with wholesome truths, polished sentences, wise sayings, rounded periods, scintillations of wit, flashes of eloquence, veins of humor, flights of oratory, and bits of wisdom, which should fall into the large and fertile field before me and bring forth the very best of fruit.

But the thought is useless. If I were even able to carry you up into the clouds, surround you with all the beautiful exaltations of irresistible eloquence, float you in the ethereal fields of happiness on the enchanting wings of grandiloquent oratory, and at the turning point undertake to bring you back to earth in an easy way—you would fall from my hands and "come down like a stick," and, perhaps, with a "dull and sickening thud!"

Dislike them as you may, apologies are always in order, and you will be forced to accept what I may say as an apology for the duty you have imposed upon me.

But I have cited only the beginning of the tribulations of your comrade. I never made a public address in my life, and am too old to begin now. You will remember what the young orator said:

"You'd scarce expect one of my age
To speak in public on the stage."

That applies to me, Mr. President, and your association should have taken that fact into consideration before electing me to this trying position—the greatest of this general passenger agent's tribulations.

I started out with the best of intentions. Had read the old proverb which says—

"God puts a good root in the little pig's way," and thought I might make a subject of that. I said, here is the good root in the grand opportunity before me to say something good, something beneficial, something new, something eloquent, something classical, something erudite, something beautiful, and something startling, perhaps, and best of all something entertaining to my associated general passenger agents; but what can a "little pig" like myself do with it? I abandoned the text of the delightful proverb—

"God puts a good root in the little pig's way," and turned my attention in another direction.

I called to mind the old couplet—

"Cold broth hot again—that loved I never;
Old love renewed again—that loved I ever."

And under this head I thought I might say, how pleasant it is to be here! How glad I am, with the rest of you, that the old association still lives! It has been in existence for forty-one years, and I have been a member of it with some of you for more than twenty years. What changes have come even in that short period of time!

The conditions which surround our present association are quite different from those attending it in earlier years. But the same reasons, or more comprehensive reasons if you please, prevail as to why the organization should be augmented and perpetuated. While it is true that the district associations of the country now perform the duties of our old associations so far as passenger fares are concerned, yet they do not maintain and develop the functions which should and can be made the prerogatives of this association. Why should not the "old love" be renewed?

Inestimable good may come from our meeting once a year and exchanging ideas and sentiments with one another relating to the passenger transportation interests of the country. Subjects of detail may be left behind, but general subjects, which have a bearing upon the individual as well as the collective interests of the members, should be discussed, and their views liberally exchanged. Every member should be entirely willing that his education and his experience might be placed before the younger—as well as the older—members, to aid them in the proper performance of their duties, and to assist in developing those broader and greater principles which are so essential to a proper accomplishment of the enlarged demands upon us as general passenger agents.

We should have a committee who will select subjects for each meeting, who will promulgate them through the secretary, and every member should go to the meetings prepared to say something which may be of benefit to his neighbor as well as to himself, and thus assist in raising us up out of our narrow channels and ideas and placing us upon a more extended plane, which will put us in the ad-

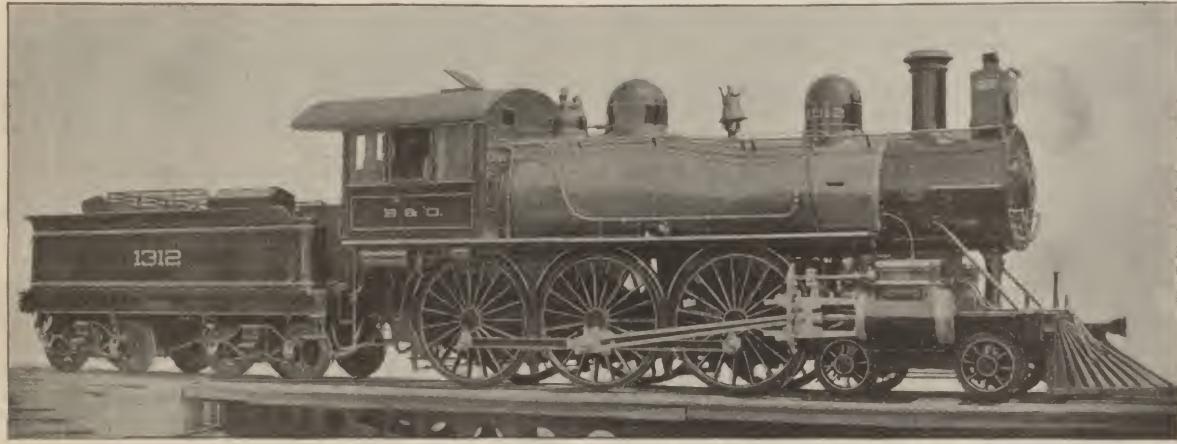


FIG. 4.—BALDWIN TEN-WHEEL LOCOMOTIVE WITH 78 INCH DRIVING WHEELS.

Kind of horizontal seams	butt, butt
Kind of circumferential seams	double riveted
Material of tubes	Iron No. 12 w.g., iron No. 12 w.g.
Number of tubes	231, 231
Outside diameter of tubes	2 $\frac{1}{4}$ in., 2 $\frac{1}{4}$ in
Length of tubes over tubes sheets	14 ft. 7 $\frac{1}{2}$ in
Inside length of fire-box	120 $\frac{3}{8}$ in., 120 $\frac{3}{8}$ in
Inside width of fire-box	41 in., 41 in
Depth of fire-box from crown sheet to bottom of mud ring, [F 7 $\frac{3}{8}$, B 61, F 7 $\frac{3}{8}$, B 61	
Water spaces, sides and back	3, 3
Water spaces, front	4, 4
Crown plate stayed with one T iron front, bolts 1 $\frac{1}{8}$ in. dia.	[Radial stays, radial stays
Diameter of dome	31 $\frac{1}{2}$ in., 31 $\frac{1}{2}$ in
Height of dome from top of rail with box in gen. of ped.	[14 ft. 9 in., 14 ft. 4 in
Steam pressure, pounds	190, 190
Kind of grate	Rocking Co's. Pat
Grate surface, square feet	34.27, 34.27
Heating surface of fire-box, square feet	215.2, 215.2
Heating surface of tubes, square feet	1,978.52, 1,978.52
Total heating surface, square feet	2,193.72, 2,193.72
Height from top of rail to top of smoke stack	15 ft. 0 in
Tires, kind and make	[14 ft. 7 in
	Standard steel

designing engines for the special conditions of their work is appreciated.

THE TRIBULATIONS OF A GENERAL PASSENGER AGENT.

Or Thoughts Picked at Random from the Scrap Heap of Experience and Recollection.*

I feel to-day in the presence of these beautiful and accomplished ladies, and standing before these intelligent and experienced gentlemen, very much as I felt at the opening of the battle of Stone River, Tennessee, on the 31st of December, 1862, "a little shaky in the knees." I would have run then if my comrades had led the way; I will run now if you start first—and I may run in spite of you.

The distinguished honor which has been conferred upon me by an election to make an address before you is highly appreciated, and I wish to thank you for it; but must remind you that I cannot share in

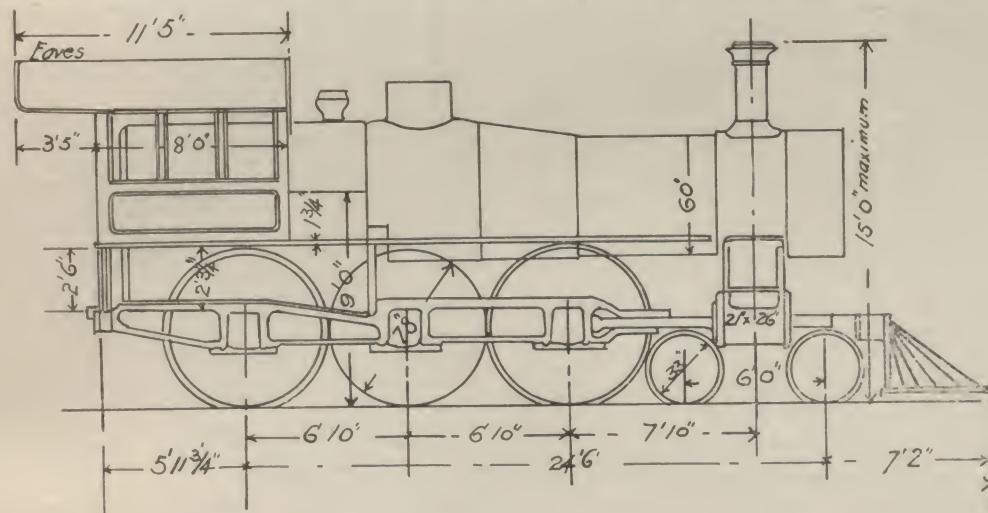


FIG. 5.—DIAGRAM OF BALDWIN, TEN-WHEEL LOCOMOTIVE.

Guides and cross-heads, type and metal, two-bar type, iron c. h. guides, cast steel hd
Connecting rods, parallel rods 1 section, solid ends, steel
Brakes, Westinghouse, American outside equalized, sch. x. m
Lubricators Nathan S. F., Nathan S. F.
Injectors No. 10 Metropolitan, No. 10 Metropolitan
Valves three Coale muffled, 2 $\frac{1}{2}$ in., 2 $\frac{1}{2}$ in
Gages two Crosby thermostatic
Springs B. L. W., B. L. W.
Headlights 18 in. sq., 18 in. sq
Special devices, compressed air signal, Leach sander, Gold steam heating device, Gould coupler
Tender.

Wheels	36, 33
Axes	steel, steel
Size of axle journals	4 $\frac{1}{4}$ x8, 4 $\frac{1}{4}$ x8
Water capacity of tank	3500, 3500

the responsibility for that action. When you selected me as your orator you very well knew that I was only an ordinary man, of ordinary intelligence (although of twenty-five years or more experience in the active life of a general passenger agent), and had never made a public address, nor manifested any pretensions in that direction. Therefore, you must shoulder the responsibility which follows what I may say on the subject, or subjects, which may be called at the outset "The Tribulations of a General Passenger Agent; or, Thoughts Picked at Random from the

*Address of Mr. E. A. Ford, General Passenger Agent of the Pennsylvania and Vandalia lines, before the American Association of General Passenger Agents, at Atlantic City convention.

vance of all that is good and reasonable and right in the progress of railway civilization in America.

If one member is older and more experienced and better "posted" than another, I know of no reason why he should be unwilling to give his neighbors in the passenger service, and his competitors if you please, in a general way, the benefit of that knowledge and experience in order that the great building of railway intelligence and of railway progress, especially in the branch of it which relates to passenger transportation, shall be on a firm foundation, of symmetrical form and of durable finish.

The social feature of our meetings can be made beneficial.

"Old love renewed again—that loved I ever."

Why should we not assemble once a year, bringing our wives and daughters that they may become better acquainted, exchanging the little amenities which makes life so pleasant, and which when they better our lives socially, certainly better them in a business way, and make us better prepared and better fitted to conduct our correspondence and our interchange of views on railway questions. Personally knowing a man, we understand very much better how to write him and how to accept a letter from him. The personal acquaintance among railway men interested in the same object, namely, the advancement of passenger transportation interests, is of great value and should not be underestimated. How can this acquaintance be better brought about than by yearly meetings, when personal experience shall be freely exchanged and when personal and business views shall be expressed and comprehended?—every one of us going away from such a meeting benefited and better prepared for the performance of our duties to the companies we represent as well as to ourselves.

I sent to your secretary a suggestion that the subject of "Closer Relations" ought to be discussed at this meeting. That subject might be embraced under the one we are now considering. We ought to come into closer relations with one another. The membership of this association should include the general passenger agent of every important transportation line on the North American continent, and it should meet at least once a year at some central and convenient point. The older members should be glad to welcome the younger, and the members representing the larger roads should extend a welcoming hand to all of the representatives of smaller corporations. The older members are passing away one by one, and the younger and newer members must take their places. Should they not be fitted for it? Is it not our duty from the great platform of a noble humanity to give to our neighbor, if he wishes it, the benefit of our experience, our trials and our successes, in order that he may accomplish his ambition, roll on the wheel of progress, and in later years look back upon our memories in a pleasant retrospect?

"Don't measure other people's corn by your own bushel."

Selfishness, so far as it exists among us, should be thrust into the background and kept there. When we come together in meetings like this, enlarged as we hope they may be to embrace the whole country, our individuality should be obliterated, and we should stand together in closer relations for the benefits which may follow to all of the interests involved. Closer relations with each other; closer relations between the different associations of which we are members, and especially closer relations between representatives of the railway systems between the north and south and the east and west cannot bring other than everlasting good!

We ought to get into closer relations with commercial travelers and those they represent in order that their desires may be more clearly understood, and to the end that the position of railway companies towards them can be better comprehended. They are an intelligent and an industrious class of people, and when shown the reasons why some of their demands are unreasonable and inconsistent with our duty to other classes of travelers and therefore to them, they will abandon hostile measures. They need the railways, and the railways need them. They are men of sense. Let us cultivate closer relations with them.

By all means, and in every way possible, should we establish closer relations with legislators. Let us inaugurate, wherever it has not already been done, a campaign of education. A great many of our legislators are ignorant of the true rights of railway companies in the matter of passenger fares. They have no knowledge of the enormous expenditure required to maintain our railways and their equipment in a safe and satisfactory condition. They have no knowledge, unless we tell them, of what it costs to transport the exacting American traveler in a first-class manner. Let us get into closer relations with them and by intelligent intercourse create a sentiment which will debar unreasonable legislation.

We are in the business of selling passenger transportation. Through our association and otherwise we should get into closer relations with the people. We should educate them to think as we do, because we know upon what foundation our convictions stand. Our patrons should be taught that their interests are our interests; that we do not represent monopolies; that we do not represent extortionists; that we do not represent soulless corporations; but that we do represent individuals who have associated themselves together as railway corporations, who have the same feelings, the same hearts and the same thoughts that they themselves have, and who are simply striving to make a living by their occupation, the same as the mechanic who plies his trade, or the farmer who follows his plow.

Our patrons should be taught to know what we know, that our fares are reasonable and just; and they are entitled to know, as we know, the reasons which justify that conclusion. We should educate our patrons, by

closer relations with them, to be friendly allies in all that makes passenger transportation a success. In being carried from one point to another the public wants only the worth of its money, and that it ought to have. The wonderful perfection of modern passenger service fully justifies the modern charges made for transportation, and the educated traveling public acknowledges it without a murmur.

"Get thy spindle and thy distaff ready
And God will send thee flax."

Some of us need to get into closer relations with our managements, and perhaps with our accounting departments as well, in order that we may be able to convince the doubtful that the passenger business of railways, by itself, pays; and that the freight business of a railway company is not the only traffic that yields a net profit. Traffic which earns to the railway companies of the United States, as passenger transportation does, more than two hundred and fifty million dollars (\$250,000,000) per year, cuts no inconsiderable figure in the net earnings of most of our railways; while on some the passenger is the only profitable business done.

I renew the suggestion that the heads of the passenger departments of all our transportation lines ought to come into closer relations, and should get together at least once a year.

"Old love renewed again—that loved I ever."

The older members, now dead and gone, who first organized this association, have left nothing in their memories but the most pleasant suggestions, and earnest ones to all in this direction—in promoting the passenger interests of American railways. Out of their meetings grew the coupon ticket which now encircles the world. Out of their deliberations grew the system of checking baggage to every nook and corner of the earth. And out of their action, followed up by the associations which have come after them, grew not only the things which have been mentioned, but everything which has put the passenger interests of the railways of America abreast of the times and in the front rank of all that pertains to progress and perfection.

But I do not believe we should hold our meetings at points on the border of our territory, or at distant points selected for the purpose of making excursions or holidays out of what ought to be business meetings. There has been too much of this in the past, and I would urge, in seconding all the efforts which may be made to enlarge the membership of this association and extend the sphere of its usefulness, that we hold our meetings at least once in each year at some large commercial center, easy of access, where three days will be given to association purposes, two of them to be devoted to business and the other to social intercourse, or what might be more plainly termed "class meetings"; where we can all "talk;" where we can all listen to each other; and where we can all be lifted up by the invigorating influences of such association. And the ladies—God bless them!—should come also. The gentle and refining influence of our wives and daughters, and the suggestions of our wives, who are in sympathy with us in our business as well as in our domestic troubles and successes, can have no other than the best possible effect upon our deliberations.

There should be no special arrangements made for excursions from our meeting points, because of the fact that it has become, to a great extent, the rule that the busiest general passenger agents may have during the year a set time for a vacation, and they therefore do not like to spend any additional time on an excursion upon the occasion of any meeting, but wish to have the privilege of returning home to their business if they may so elect. Other general passenger agents who are differently situated might attend the meeting, and then with the transportation which is usually issued by the railway companies for them and their families to and from the meeting, they could by themselves, upon the ordinary trains of the connecting lines, make excursions to such points as they might wish to visit. But the railway companies having lines terminating at the points where the meetings may be held should not feel obligated in the future, as they seem to have felt in the past, to run a special excursion or a set of them to accommodate the general passenger agents and their families. It is an expensive burden which should be placed upon no company, and any company desiring to advertise its line or the territory occupied by it should do it in some other way and relieve the general passenger agents of the charge which has heretofore been freely made, that their conventions are only for the purpose of getting together to participate in the "junketing" trip which usually follows them.

"He who lies down with dogs gets up with fleas."

In earlier times the reputation of the association meetings has been tarnished by the too free indulgence by some of its members in the "cup that cheers." There never was a law that a general passenger agent should not take a drink of liquor if he wished to do so. But there is a moral law now stronger than ever before that he shall not become intoxicated. And the fact that some of them did in times past indulge more freely than they ought to have done, most efficiently supported by the members of the "third house" who were accustomed to attend our meetings, brought the association into reproach and justified the assertions made by managing officers and others that we met for frolic rather than for business.

This suggestion did not apply to the majority by any means. It pointed only to a small minority, who were long ago ashamed of their action, some of whom have passed into the great beyond, others of whom are still with us and have since done all they could by their example and correct habits of living to atone for the wrongs they had committed upon themselves and their families and their

association, of which they were and are so proud.

The association has passed through many trials, not the least of which is the one I have mentioned. Its blemished name has kept some of its best members away from its meetings; but, thank Heaven, we are met to-day under new conditions. "Old things have passed away," and we may truthfully proclaim it from the housetops, if need be, that there is no set of business men on the face of the earth to-day that, as a class, are more temperate in their habits and more circumspect in their conduct than general passenger agents.

Can we therefore safely urge that these conventions should be held, and that they are places for exchanging common sense, experienced views, business principles and social and other features which makes us proud of ourselves, proud of our organization, and especially proud of the fact that no one—be he ever so critical—can point the finger of scorn and say to either or any of us that—

"He laid down with dogs and got up with fleas."

But, Mr. President, I have found another text, and thereby hangs another tribulation—

"Every man thinks his own geese are swans."

Those of us who are older can look back to the time when we were younger, and to the time perhaps occupied now by some of our younger brethren—when we thought "we knew it all."

"Every bird likes its own nest the best."

This is commendable in some ways, and when properly applied it is commendable always; but in what might be termed the sophomore years of our experience—the stage in his affairs which comes to every general passenger agent—we appear in such a light when we get away forward and begin to look backward, that we are absolutely ashamed of ourselves. We have had our experience and know how it feels. Some of you, as well as myself, have been in the passenger business for twenty-five years or more, and can look back to the period when you felt that you did not need advice from any one, and when you also felt that you understood the passenger problem in all its different and difficult phases, that you were as smart and perhaps a little smarter than any one else, and that your neighbor's methods were all "geese," while yours were all "swans."

Young man, get yourself out of that period just as soon as you can. It is an experience you must have, but as the older general passenger agents here present and who have urged that what I might say to you should be in the nature of suggestions and advice will also admit, it is a delusion and a snare; and long before you reach the age we have accomplished you will be willing to declare, as we now do, that our beautiful "swans" have been transformed into disgusting "geese." Go slow. Get your education by hard knocks. The pangs of experience may be bitter, but they are necessary to success. "Live and learn," and

"Learn to labor and to wait."

You may say that you do not covet our advice. That does not change our duty in the premises. We give you the result of our experience, and wish to suggest that an excellent and safe rule for your conduct in important passenger matters will be to constantly bear in mind that your competitor and your neighbor may be as bright as you are, and that he may know as much as you do—possibly more.

"Better ride an ass that carries us
Than a horse that throws us."

In my own case, at least, I am willing to admit that I am not as skillful and successful in passenger matters today as I thought I was twenty years ago. The older members of this association will make the same confession.

"Nothing is lost on a journey by stopping to pray and feed your horse."

And I stopped to pray and to feed my horse also, with the good root still in my mouth, while seeking a subject upon which to address you. You must by this time have comprehended the tribulations of the "little pig" in rooting over the scrap-heap of experience and recollection.

But, stopping to feed my horse, I looked backward and saw the beginning of this association, or a similar organization, in the year 1855. I need not remind you of its history; that is well known to some of you, and may be learned by all of you by a consultation of the records which can be furnished by your secretary. The men who formed the original association were truly pioneers. Those who became members since the first organization was formed were also pioneers to most of us assembled here to-day. They have left their record. Some of them are still living, but many of them have crossed the river and are standing just on the other side beckoning us to follow.

The names of those gone are familiar to most of you, and I refer to them for the simple purpose of reminding you, and of reminding us, and of reminding those who may follow us, of the good that they have done for the cause in which all are interested, and for the shining examples which some of them, if not all, have left behind, and which are so inviting to imitation. "Let the dead past bury its dead," and so the evil that men do may die with them, but the worthy record of the good deeds of their lives is always with us, and shall never be forgotten.

There have been left to us true precepts, excellent examples, instances of what self-made men can do, sterling business qualifications and commendable traits which should be emulated, a loyalty and sincerity which were never questioned, personal and social qualities without a blemish, in the lives of such men as Cole, Boyd, Dadmun, Chandler, J. W. Cary, S. E. Cary, Kendrick, Fitch, Pierson, Gwinner, Gallup, Marshall, Follett, Carpenter, Wentworth, Cone, Lowell and Monett, the youngest and brightest of them all, perhaps. Some of them called at old age, some called in the middle of their lives

and their usefulness, while others were cut down in the prime of their youth.

What do these spirits say to us? They tell us to go on with our work, to perfect our organization, to strengthen it in every way, to make it every year more useful than it has been in previous years, to build up from the foundation which they have laid, and to add to the structure which was partly finished when they were called away, the other stories which shall complete the edifice and make it what it ought to be—a living and perpetual monument to the intelligence, the industry, the perfect methods, the enlarged ideas and the successful measures of the American Association of General Passenger Agents.

NEW DESIGN FOR BORING AND TURNING MILL.

The accompanying illustration is reproduced from a photograph of a 37 in. boring and turning mill manufactured by the Niles Tool Works Company of Hamilton, Ohio, which has all the excellent points of the regular machines turned out by that company and has in addition thereto an independent boring head which is an entirely new feature.

This arrangement of head is especially adapted to work that requires boring or drilling that cannot be done with the standard head: such for instance, as the holes in eccentrics and similar work. The standard head is arranged so that it will swivel, and can be used for turning and boring tapered as well as straight work. The independent head is driven from a separate countershaft and cone which transmits motion to the vertical shaft shown on the left hand side of the machine, and from there to the pinion which meshes into the large gear on the

boring spindle that passes through the bar of the left hand head of the mill. It will be noted that the head is adjustable on the rail, so that it can be used on work from the center of the table up to a diameter equivalent to the full swing of the machine. This independent boring bar is adjustable for wear, is counterweighted and arranged with power feed, the same as the standard head. A clamping device is arranged, as shown on the left hand side of the table, so that the table can be held in position when the independent boring is being done. This head can also be used for turning and facing the same as the standard head. A large amount of work that requires separate boring can be accomplished on this machine with this special independent boring head by one clamping of the work, that heretofore required two settings on two different machines.

AN ADDITION TO THE NIAGARA POWER HOUSE.

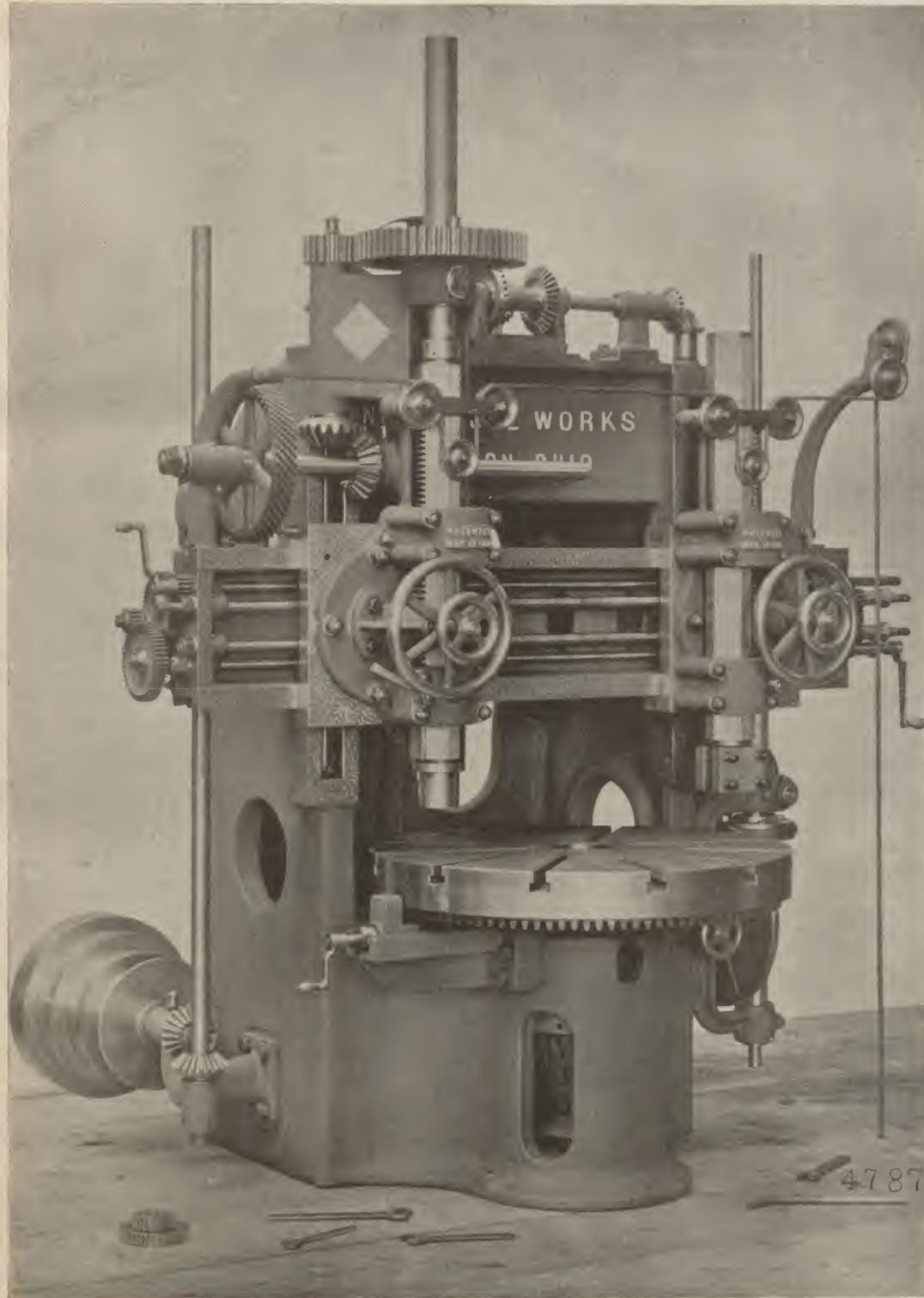
The fact that the power house of the Cataract Construction Company at Niagara Falls is being extended is an evidence of the success of the project that has been begun at that place in the direction of power transmission by electricity. Probably a large part of the predictions which have been made with regard to the future of electrical transmission from this plant will not be realized, at least for some time to come, but the demand for power is now sufficient to warrant the installation of a large addition to the wheel pits, constant increases in the application of power making this necessary. The pit is being ex-

tended a distance of 294 ft., which will make its total length 434 ft. This will give room enough for seven additional turbines, which will make ten in all. The method of carrying out the work of excavation is clearly shown in the accompanying illustrations, which were prepared from photographs. Fig. 1 was taken looking toward the power house and Fig. 2 looking away from it.



FIG. 1.—LOOKING TOWARD POWER HOUSE.

The excavation when the views were taken was about 40 ft. deep, and when completed it is to be 180 ft. deep. The width of the extension is to be about 20 ft. The total cost of the work is estimated to be about \$300,000, and the date set for its completion is May of next year. The contractors for the extension are Messrs. E. D. Smith & Company of Philadelphia, who have installed an extensive plant for the con-



NEW BORING AND TURNING MILL.



FIG. 2.—LOOKING FROM POWER HOUSE.

struction and the excavation. The rock is removed by dynamite after being cut by channeling machines. The work requires great care on account of the danger of disturbing the part of the plant now in operation. The soft material is used for filling the trestles of one of the electric railways in the neighborhood of the plant.

NEW MAIL CARS FOR THE WABASH RAILROAD.

Two new postal cars have just been built at the Toledo shops of the Wabash Railroad of which Mr. M. M. Martin superintendent of the car department of the road, sends the following details:

Length of car over end sills	60 ft. 8 $\frac{1}{2}$ in
Length of car over end sheathing	60 ft. 10 in
Length of car over sub-sills	62 ft
Width of car over side sills	9 ft. 10 $\frac{1}{2}$ in
Width of car over sheathing	10 ft
Width of car over eaves molding	10 ft. 3 in
Width of upper deck outside of eaves molding	6 ft. 2 $\frac{1}{4}$ in
Width of end door between posts	2 ft. 3 in
Width of side door between posts (mail end)	2 ft. 3 in
Height from top of sills to bottom of plates	6 ft. 10 in
Height from top of track to top of upper deck	14 ft. 7 in
Distance from center to center of trucks	45 ft. 5 $\frac{1}{2}$ in
Distance from center of truck to outer face of the end sill	7 ft. 7 $\frac{1}{2}$ in
Inside length	60 ft
Inside width	9 ft. 3 in

The cars have no platforms and are equipped with Gould couplers and buffers; also, a solid vestibule

with chafing plates, which is made to act with regular vestibules to prevent telescoping in case of accidents. The bars are equipped with Harrison racks, and with 68 paper and 510 letter boxes; also, with Pintsch gas lamps, and with the Westinghouse automatic quick action brake, with the latest improvements and all the usual attachments with 14 in. cylinder, and brakes applied to all wheels; also, with the Westinghouse train signal. The trucks are of the Wabash standard 6 wheel pattern with 33 in. 600 lbs. cast iron wheels.

A WATER TUBE LOCOMOTIVE BOILER.

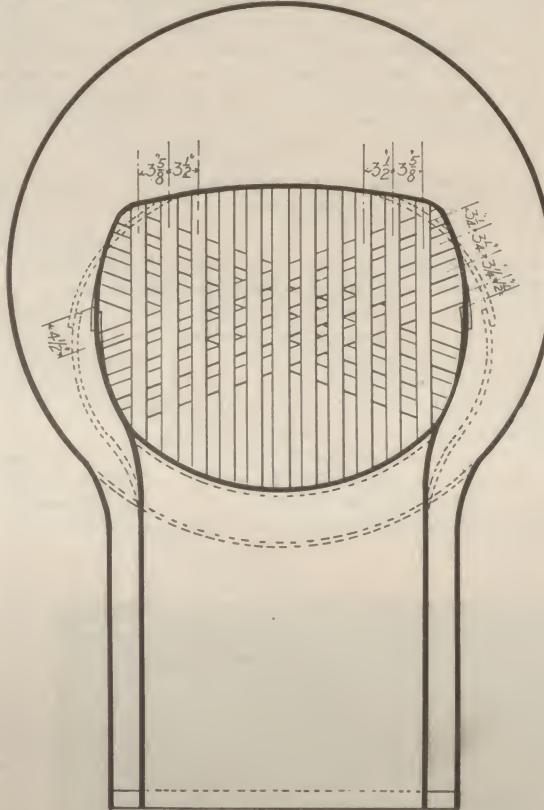
Suggestions have several times been made of the probable advantage to be gained by utilizing the water tube principle in locomotive boiler construction and an interesting example of such a design is now undergoing practical trial upon two western roads. These boilers have not been subjected to efficiency trials but have been turned out among other engines to demonstrate the practicability of the idea and it is expected that before long careful tests will be made to compare them with those of the usual design.

One of these is upon an 18x26 freight engine now running on the Chicago division of the Chicago, Milwaukee & St. Paul Railway. The device consists of an inner shell or tube chamber filled with a series of vertical and diagonal tubes alternately disposed throughout its entire length. The tubes being rolled at each end, each tube acts as a brace to prevent the collapse of the chamber. The chamber is composed of two sheets of $\frac{1}{8}$ in. steel, with longitudinal seams on the sides, the top of the chamber being connected with and a continuation of the crown sheet. The sides and bottom are deflected outwardly the forward end of fire-box being made to conform to the shape of the chamber. The chamber occupies the space in the outer shell, ordinarily taken up by the horizontal tubes and it is connected at the back end with the crown sheet and the side sheets of the fire-box and also by means of a flanged throat-sheet at the bottom. It is connected at the forward end with a doubly flanged flue sheet to fit the outer shell and the chamber. Sufficient space is left between the chamber and the outer shell to allow for movement in longitudinal expansion and contraction. The expansion and contraction of the tubes is practically overcome by their short length. The movement of the chamber and the tubes being equal, there is nothing to cause leakage of the tubes in the joints where they are rolled in the chamber.

This is the third engine equipped with the Perkins boiler by the Chicago, Milwaukee & St. Paul Railway. The first having been in use about three years and the second, twenty-one months. There is also one running on the Winona & St. Peter division of the Chicago & Northwestern Railway, which has been in service about six months and up to this time is reported to have shown no indication of leaking tubes. Much trouble is experienced on that division

with bad water. The first of these engines in service on the Chicago, Milwaukee & St. Paul Railway is reported to have made a very satisfactory showing in economy of fuel. The second showed a slight improvement over the first, the number of tubes having been increased by thirty-three. From the last one Mr. Perkins expects much better results, as it has 173 more tubes than the first one. This boiler, as illustrated by the accompanying engraving, has 565 tubes. Owing to the construction the heat is believed to be much more thoroughly absorbed in passing through the chamber and coming in contact

says that there never has been any leakage in any of the tube joints, demonstrating that the cause of leakage by expansion and contraction, is practically overcome. Another strong claim for this construction is that the boiler has a perfect and positive circulation of the water, resulting in keeping the tubes clean and despositing the sediment in the form of soft mud in the bottom of the outer shell, where it can be readily washed out. Under natural draft, this boiler will get up steam much more rapidly than the ordinary type. This plan can be applied to the ordinary locomotive boiler at about the same cost as a

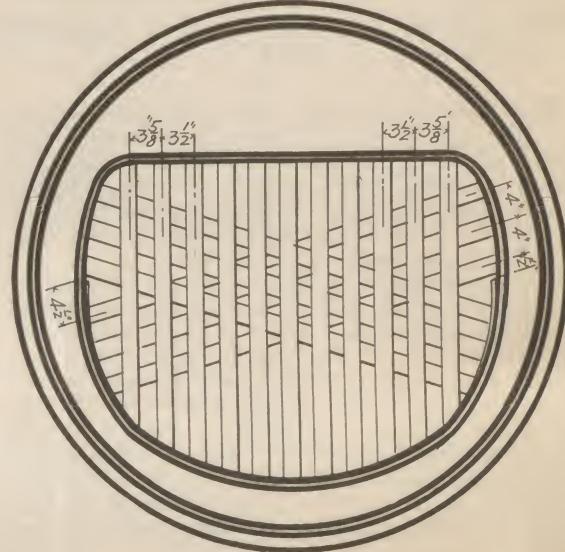


Section through 'CD'

FIG. 2.

with all the tubes than in passing through the tubes in the ordinary type of boiler. The engine does not throw any sparks out of the stack, the cinders being broken up and almost entirely consumed in coming in contact with the tubes in passage through chamber, so that no live sparks are deposited in front end.

In the first boiler, after about three years of freight service, some of the tubes exposed to unequal draft became worn by the abrasion of the cinders so as to necessitate their removal. That difficulty however has been overcome in the later constructions by a more equal division of the draft space. Mr. Perkins



Section through 'AB'

FIG. 3.

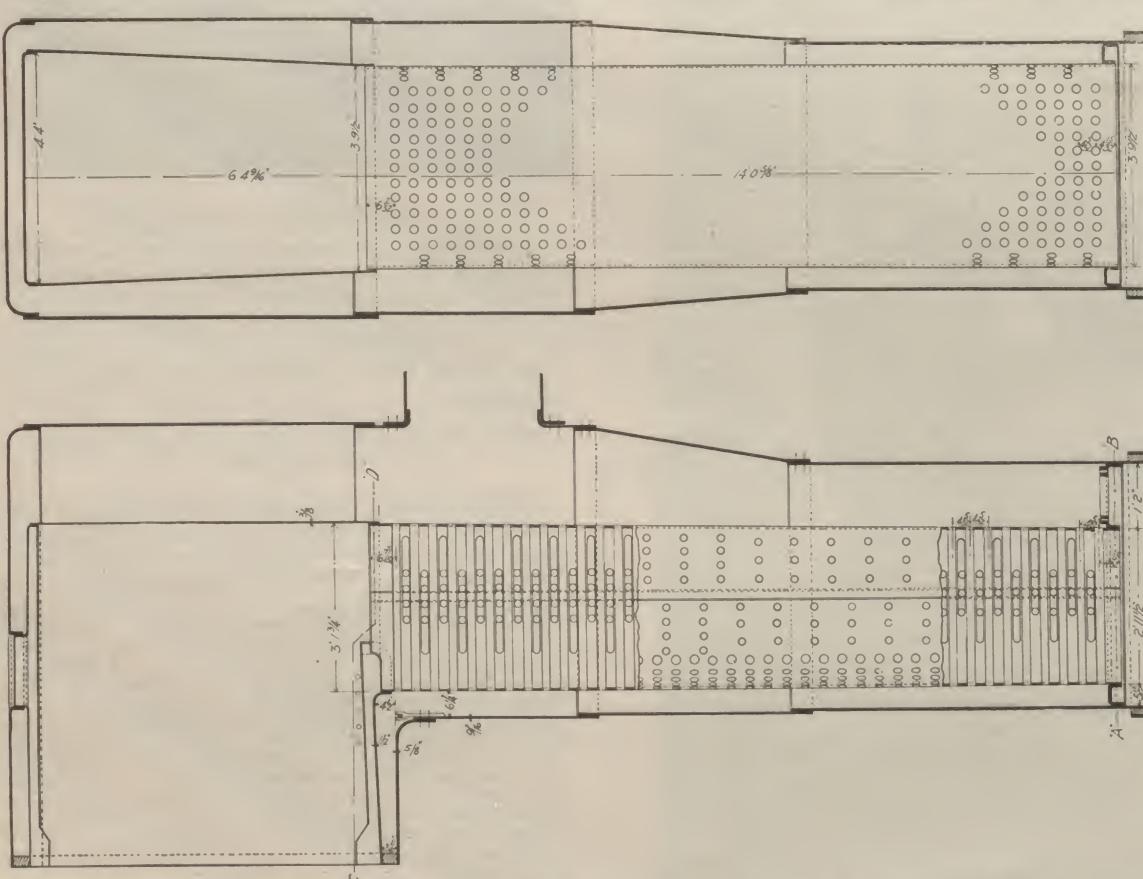
new set of flues and flue sheets and under entire new construction the boiler should be built as cheaply as the ordinary type. The device can be tested before being placed in position in the outer shell, and any faulty tubes that may afterward develop can be got at by removing the dry-pipe. Should new tubes be required the chamber can be taken out of the shell at the forward end without much expense.

The inventor and designer of this boiler, Mr. G. J. Perkins, has been a locomotive runner for a number of years, and is now employed by the Southern Pacific Railway. He is sufficiently confident of the superiority of this construction to guarantee a saving of 10 per cent in fuel over that required for a comparable boiler of fire-tube construction. Further information with regard to the boiler may be obtained from the Perkins Water Tube Boiler Co., of LaCrosse, Wis., of which Mr. Perkins is president.

ARRANGEMENT OF WOOD WORKING MACHINERY IN RAILROAD SHOPS.

An item of great importance in conducting such work as the construction and repairs of railway cars is an arrangement of the machinery in the wood working shops or planing mills, whereby all possible advantages may be gained by saving unnecessary lifting and lost motion of the parts and timbers in passing from one machine to another in their course through the shop. In this connection a prominent car department officer recently said that in all the work which was conducted in connection with cars he considered that the greatest possible improvement lay in the direction of advantageous arrangement which would save the handling of material. An arrangement of this kind is exemplified in the planing mill of the Chicago, Milwaukee & St. Paul Railway at West Milwaukee, Wisconsin. This building is provided with three incoming tracks at one end for bringing in material from the adjacent lumber yards, and upon the opposite end of the building are two out-going tracks over which the finished material is carried directly into the erecting and repair shops or the repair yards. Through the courtesy of Mr. J. N. Barr, superintendent of motive power, and Mr. J. J. Hennessey, master car builder of the road referred to, we are enabled to present a diagram of the floor of the building giving the locations of the different machines. The arrangement is such that the large timbers are neither raised nor lowered in transferring them from one machine to another. They are passed over a series of horses placed upon the floor of the shop and equipped with rollers for ease in handling. In some cases however the machines are placed sufficiently close together to permit of passing the timbers onto the next machine, leaving them in the proper positions for the succeeding operation. It is only in the case of the smaller parts the trucks are used.

It will be of interest to trace the movements of the timbers through the shop. Such timbers as sills and



THE PERKINS WATER TUBE LOCOMOTIVE BOILER—FIG. 1.—LONGITUDINAL SECTIONS.

plates are taken into the shop on the incoming track No. 1, and are passed through the large sill dresser marked "A" in the illustration. What may be termed the head end of the timber is then cut off squarely on machine No. 2, and that end is then tenoned at the next machine which is No. 3. The timber is then moved along upon the shop gage which is in line with the two previous machines. A gage on this carriage stops the sill at the correct point to bring the other end of the sill in position opposite the saw so that it may be squared, at that end, to the proper length. The back end of the sill is then tenoned on the tenoner No. 3. The sill is then ready

to be marked out by templates and it is skidded near the shop gage for this operation. The next movement is to the four spindle boring machine No. 4, where it is bored, and from there it passes to machine No. 6, for whatever angle boring may be necessary. The mortising is done at the hollow chisel mortiser No. 7. The next and the last operation is done on the gaining machine No. 8, and the timber is then rolled upon a car on No. 1, outgoing track on which it is taken to the erecting shop. In all of its course through the building no additional help is required beyond the regular machine attendants who pass the timbers on to the next man by means of the rollers.

The intermediate and center ribs for roofs are brought into the shop on incoming track No. 2, and pass through the machine marked "B," which is a 15 inch matcher and dresses the four sides at once. The pieces are then passed on to cut-off saw No. 12, thence to machine No. 19, for gaining and next to machine No. 10, for boring. This completes them and they are loaded upon cars upon outgoing track No. 1, for the erecting shop. The rafters are taken into the shop on track No. 3, and are passed through the sill dresser No. 14. From there they go to the cut-off saw No. 16 where they are cut to length. No. 20 is the next machine and cuts them to suit the pitch of the roof. The next work is done upon machine No. 9, which cuts the inside circle. The shaper No. 19, performs the following operation whereupon the timbers are passed to the tenoner No. 21, thence to No. 22, for gaining and to No. 23 for boring. They are then transferred to cars on No. 1, outgoing track.

All posts are taken into the shop on incoming track No. 3, and pass first through machine No. 14. They are cut to length at No. 16. They go to No. 17, for tenoning, to No. 18, for grooving, to No. 19 for shaping to No. 23, for boring and to No. 24, for mortising. From this machine they are transferred by means of trucks to cars either upon No. 1, or No. 2, outgoing track, according to which is the more convenient. The course of truck timbers is from incoming track No. 3, to sill dresser No. 14, to No. 15, to be cut to length where they are placed on trucks and transferred to boring machine No. 30, from which they go to the hollow chisel mortiser, which is marked No. 6, and is located near No. 30. From this machine they go to the shaper No. 33, where the worker is completed and the material is loaded on cars on outgoing track No. 2.

This is a case wherein the machinery has been arranged in an old shop to accomplish the desired result, and considering the shape of the building, the manner in which the planning was done is admirable and speaks for itself to any one who traces operations through the building. This layout was the result of much study and planning and the smoothness with which it is working is attested by the fact that after the plan which is here shown was adopted only a few minor changes have been made. The advantage of such a systematic plan amply pays for the trouble in making it.

MULTIPLE SPEED RAILWAY AT THE BERLIN INDUSTRIAL EXPOSITION.*

The details of the design and construction of the multiple speed railway, sometimes called the "movable sidewalk" which was installed and operated at the Columbian Exposition in Chicago have been described and illustrated in this journal * and it is of interest to know that the same principles have been applied with some constructive modifications in an installation which was put in at the Berlin Industrial Exposition, opened May 1 of the current year. This multiple speed railway was constructed under the patents of Mr. Max E. Schmidt, civil engineer and Mr. J. L. Silsby, architect which also formed the basis of the plant in Chicago.

The Berlin plant connects two separate parts of the exposition grounds which are in the form of a park known as the "Vergungung Park." These two divisions of the park are separated by a street. The structure is elevated and passes over this street on a bridge of 80 ft. clear span. The road is elevated about 25 ft. and is supported on frame bents. The alignment of the road is in the form of the letter S with curve 58 ft. radius. The length on the center line is 1,500 ft. The rolling equipment consists of 122 cars in the bottom train and 124 in the top train which are operated by ten, 15 horse power motors connected in service.

The motors are placed equidistant throughout the train so as to distribute the strain uniformly. The velocity is 3 miles per hour for the bottom, or slow moving train, and 6 miles per hour for the top,

*See the RAILWAY REVIEW December 6, 1890, September 12, 1891, and October 31, 1891.

or fast moving train. The essential difference in construction from the plans at the world's fair are first: The moving rails, or those which carry the top train, are made with a sliding point between the cars to allow them to change the lengths on curves. Second: The side bearing, or rail guard, for the moving rails are made in the form of roller side bearings instead of merely iron blocks. This converts the sliding into rolling friction reducing lost motion and noise. The power required to move the trains at the velocities mentioned was 28 to 30 electrical horse power.

The road was operated without any delay or accident, from May 28 to Aug. 10, 1896, at which time our informant left Berlin. The road was built by German capitalists, as a temporary affair to be operated only during the exposition May 1 to Oct. 30, 1896, with a view to demonstrating its feasibility as a mode of suburban travel. It is said to have been well received in Germany where other applications of the plan are now under consideration.

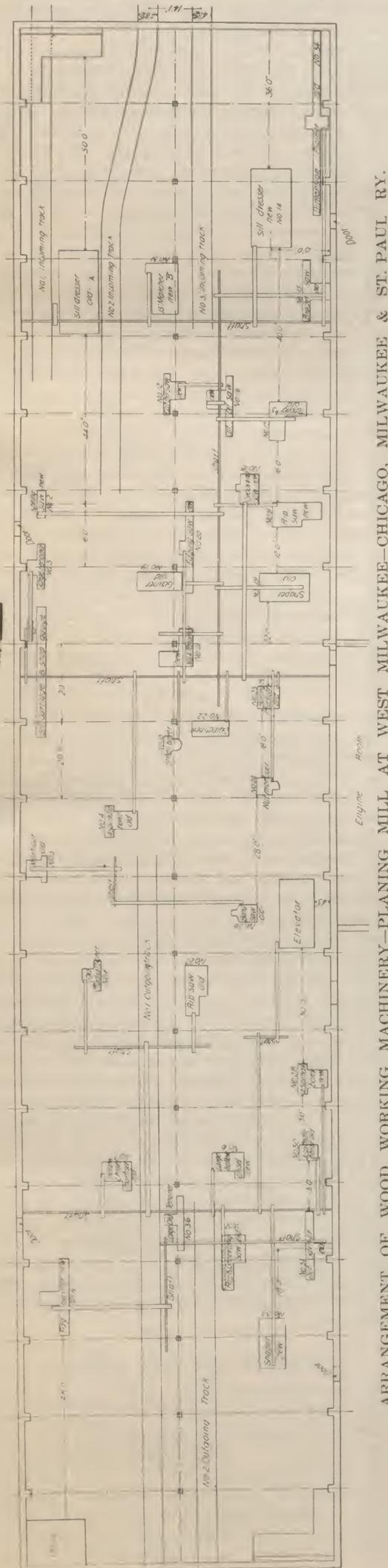
A BUSY DAY FOR ELECTRIC TRACTION.

Beside other demonstrations which electric traction has made as to its ability to handle the traffic of a busy road is in showing a remarkably small number of delays due to the electrical equipment which is somewhat contrary to the expectations of those who have thought electric machinery particularly liable to derangement. An excellent example of the reliability of electric motors appeared in the handling of the large amount of extra traffic on the Metropolitan West Side Elevated Railroad in Chicago, on October 9, the occasion of the two large political parades. The passenger reports show that 90,000 people were carried in 24 hours, the greatest number being transported between 9 a. m. and 11 p. m. of that day with a comparative quiet interval between 1 and 2 p. m. The only special arrangements made for handling the crowd was to increase the number of cars in the trains. Ordinarily two cars are run in each train between 9 a. m. and 4 p. m. and three cars during the busier hours of the morning and early evening. On this occasion three cars were run on every train all day and an additional car was put on between the hours of 9 and 11 a. m. 2 and 5 and 9 and 11 p. m.

The road consists of a main line which extends from Franklin street to Marshfield avenue. From the latter point four lines diverge running to Logan Square and to Humboldt, Garfield, and Douglas parks. The intervals on each of the four branches were regular throughout the day, the trains being run 6 minutes apart on each branch, which brought the intervals between trains on the main line down to 1½ minutes. This schedule was maintained absolutely throughout the day, and even during the busiest hour, between 9 and 10 a. m., when 10,421 passengers were landed in Chicago. On an ordinary day, from 7,000 to 8,000 passengers have been carried in an hour, but the number has never reached that on the occasion mentioned. On ordinary days the minimum number of passengers per hour runs as low as 1,000 and the lowest on October 9th was 3,000 per hour.

This extra traffic did not require the employment of a single additional man, but the regular gatemen put in extra time. There was no extra expense in the power house except that occasioned by the heavier loading of the trains which brought the total output of current to about 10 per cent above that of the average day. This would indicate that the capacity of the road is far greater than the greatest demands which are likely to be made upon it for some time, and it is estimated that a quarter of a million passengers could be carried in one day with the present equipment without any extra help except a few additional gatemen. The regularity with which trains are now running on this road is worthy of remark. Mr. W. E. Baker, general manager, states that in the past 6 months there has not been a single delay of a train due to a failure of, or defect in, the electrical apparatus.

It is stated by an expert superintendent of motive power that on no road in the country has the locomotive power been graded to the increase of traffic, both passenger and freight, and to the increase in size of cars so systematically as has been the case on the Pennsylvania lines. To illustrate, he said that 23 years ago the trainload between Pittsburgh and Columbus was 19 cars per locomotive; now it is 19 cars, and the car of to-day has 60,000 lbs. capacity, while that of 23 years ago had 24,000 lbs. capacity. The power of the engines now used has been increased in the same proportion, and the same remark will apply to the passenger locomotive power.



R THE RAILWAY REVIEW

OFFICE OF PUBLICATION:

The Rookery, - CHICAGO, ILL.

Eastern Office: 189 Broadway, New York.

TERMS OF SUBSCRIPTION:

Per Year..... \$4.00

Foreign Subscription (including postage)..... 5.00

Convenient binders sent postpaid for \$1.00.

PUBLISHED EVERY SATURDAY: Subscribers are requested to give information of any irregularity in receiving THE REVIEW.

Rates of advertising made known on application.

All remittances should be by Draft, Express, or Money Order, payable to THE RAILWAY REVIEW.

Address all communications to THE RAILWAY REVIEW, Rookery, Chicago.

CHICAGO, SATURDAY, OCTOBER 17, 1896.

WITH a decline this year in the production of pig iron of 3,000,000 tons as compared to last year, and with strong probabilities of a more active year in 1897 than for three or four years, it would seem that it would be wise for large manufacturing interests to secure prudential supplies. This, some few are doing. Uncertainty as to the money market prevents many from taking precautionary action. Besides they say production by next spring can reach desired proportions, and there will be no great rush of iron until then. More or less American iron and steel is finding its way to Europe, and a few days ago an order for 11,000 tons of steel rails was placed at one of our rail mills, for Japan delivery at \$22.50 which is a preference of 45.50 cents per ton in favor of foreign buyers. There is just now a scampering of American agents in foreign countries, after orders and some interesting results are anticipated. The election will be followed by a hardening in values, but the great body of buyers and manufacturers are more anxious to see it than "hear tell" of it, yet it will come.

THE important part which Mr. George H. Corliss played in the development of the steam engine with reference to economical performance is too well known to require special mention, because of the fact that the product of the works which he built up tells this story very well, but it is not so well known why the type of valve motion which was the mainstay of these engines occupies a position to-day which the best efforts of many designers of other good valve motions have not been able to offset or overcome. There is no reason to think that the Corliss valve gear is better than any of a number of other good ones, but this type has a reputation which is very persistent and deservedly so. A contemporary explains this by showing that the motion which is actuated by a single eccentric does not permit of governor regulation whereby the cut-off can be made to occur at a late position in the stroke. This would prevent an engine from being run at an uneconomical point of cut-off. This plan, for it must have been premeditated, made it necessary to install engines which were sufficiently large for the work which they were designed to perform, and cheese paring policy with reference to putting in engines that are too small for their work was prevented when the engines were making their reputations. The reputation has stuck to the valve gear and is even now having an influence in the engine business.

WHILE the locomotive testing plant as a piece of experimental apparatus is appreciated by many, it is doubtful if the far reaching influence of this adjunct in the study of locomotive designing is given the high place which it deserves by the majority of railroad men. Perhaps nothing could show the real value of this machine better than the records of the

tests on the plant at Purdue University which formed the basis of the paper presented last month before the New York Railroad Club by Prof. Goss, an abstract of the discussion of which appears on another page in this issue. It is not difficult to find records of experiments upon locomotives upon the road which will prove almost any proposition which can be made concerning the combustion of coal, and it is only by the elimination of more or less of the unknown quantities that the correct bearing of road experiments may be seen and understood. Road tests which are made in connection with experiments upon stationary test plants will tell the truth about many things which are now in doubt, and there is ground for congratulation that the beginning of the study of the locomotive in this way has been made. A locomotive testing plant is far from being a non-productive machine and since it has made itself known so favorably in two instances or examples it should not be long before more roads adopt it and look to it for means of improving designs. Prof. Goss has in a practical way shown the scientific value of the machine, and one of the speakers in the discussion referred to, urged the railways to enter more deeply into the matter of scientific investigation, quoting German practice in manufacturing lines. The reason for the improvement in manufacturing whereby Germany has in many cases surpassed England, was stated to be that in the former country the large industrial establishments were making use of scientific laboratories as complete in their appointments as those to be found in the universities. This constitutes a suggestion which should not be allowed to fall unheeded and after reading Prof. Goss's paper, one must be more than ever convinced of the possibilities in the direction of improving the combustion of fuel which are offered by the form of apparatus which he employed.

ENGLISH AND AMERICAN LOCOMOTIVES IN JAPAN.

From the title above it may be inferred that readers of the following paragraphs are to be inflicted with another installment of an endless discussion upon the relative merits of English and American locomotives, but this is not the intention nor do they owe their inspiration to any expectation of proving American locomotives superior to others, but rather to the desire for fairness of bases for comparison when comparisons are made. There is no reasonable ground for arguing that because locomotives are built in England or in America they are better than those which may be constructed somewhere else. It is obvious that the question of economical operation is decided by the proportions of the constituent parts of the locomotives and their arrangement which permit of making and using steam to the best advantage. Comparative tests of locomotives designed and built in different countries can show only the degree of correctness in these proportions which have been attained by different designers, and that fair comparisons in individual tests covering but a short time are almost impossible to make, while locomotives are running on the road, is conceded in the country, as is shown by the fact that nearly all such tests are discredited because of the impossibility of duplicating conditions. It is, however, not to be claimed that tests covering long periods, in which care is taken in making observations are equally unfair. The point is that there are so many variables in short tests upon the road that one cannot be sure that conditions are equally favorable to all of the engines tried unless perhaps the tests cover months and are so nearly parallel as to make it possible for an equal number of favorable circumstances to occur for each engine. It may be said that such comparisons are too expensive to be undertaken by anyone, and that the only method which can be considered satisfactory is to put the engines upon a testing plant where accurate observations may be made and all of the operations may be controlled.

Mr. Francis H. Trevithick, who by the way, is a grandson of the famous English engineer, has recently presented a paper before the Institution of Civil Engineers, of England, which compares English and American locomotives in Japan by means of the results of a few pulling trials on a hill and by consumption records covering several months. The results shown give the impression that a great deal of money may be saved by the employment of English

designs and construction, and inasmuch as our engineers would be exceedingly glad to know of ways in which they may improve their locomotives, it appeared worth while to examine these results. The comparison which is of greatest interest was between two ten-wheel engines of which the American design will be designated by class A and English by class B. Of class A, several locomotives have been furnished by the Baldwin Locomotive Works and the class B engines were furnished by English builders, and they were to work under similar conditions. Class A has cylinders 18 x 22 inches, a heating surface of 1,231 square feet; a grate area of 18 square feet; a boiler pressure of 140 pounds, and a total theoretical tractive force of 17,641 pounds, when figured upon the basis of a mean effective pressure of 85 per cent of the boiler pressure. The class B engines have cylinders 16x22 in., a heating surface of 991 sq. ft.; a grate area of 16 sq. ft.; a boiler pressure of 160 lbs., a theoretical tractive force of 15,053 lbs. The driving wheels of both types are 4 ft. in diameter and both engines have an excess of weight on the drivers. The American engine has 10.8 per cent more theoretical tractive force than the English, and during the tests was shown to be able to pull more cars. The test was made on an incline about 15 miles long, and examination of the tables shows that the American engine hauled equal trains 4.3 per cent faster than the English engine and with an advantage in fuel economy of 4.3 per cent. Though this deduction is not made in the paper, it is evident that the American engine would haul about 10 per cent more than the English one, but that this constitutes any advantage of design is not certain, and the only fact developed by these tests is that both engines did very well with no important advantage in economy for either. The point, however, which renders the paper open to criticism is a comparison in which the fuel consumption of the different engines is given for a number of months during the years 1890, 1891 and 1894 and which includes English engines other than those which participated in the pulling trials referred to. The average train for all of the engines was about the same, but was very much lighter than the most efficient loading of the American engine, being more nearly adapted to the English engines. The most uncertain things about these tests are the conditions under which they were carried out, no statement having been made as to whether the conditions were identical, and as special months are selected, it is doubtful whether the same results would be shown for the entire time between April, 1890, and the end of September, 1894. The differences between the types are given in the form of the economy of one of the English over the American engines, and it is shown that by using class B for 200,000 miles in one year, the saving in coal and oil would be nearly \$5,000. The English engine used about \$185,000 worth less oil than the American, the reason for which is not clear.

It is not to be supposed that these figures will be accepted by anyone as proof positive that purchasers of American engines are at such a disadvantage with respect to those buying English ones without knowing absolutely that the data is fair, and upon this the paper is silent. If anyone looks to this paper for information wherewith to improve designs, he will find little that is helpful in it, but will be impressed with the importance of knowing that all the conditions of the comparison are similar, or of knowing the errors which should be applied in correcting the results. A scientific comparison of these two types of locomotives would be of considerable value to all parties interested in locomotive construction, but attempts to show the superiority of one over the other merely emphasize the fact that figures can be made to support any argument providing the proper figures are selected.

RATE WARS AND RATE CONTROL.

Notwithstanding the many costly lessons given to railway men growing out of the numerous rate wars of the past, it appears that some of them have little profited thereby. It was a common thing in former days to ascribe the inauguration of a rate war to the "maintenance of a principle", whatever that may mean. A manager might be employed to administer the affairs of a railroad corporation for the best interests of its owners, and straightway he would pro-

ceed to engage on "principle" in a contest with some other manager to the utter destruction of net revenues. Nor has this idea altogether departed from the minds of those at present charged with the conduct of these properties. "Maintenance of principles" is still the alleged reason for practically all the rate disturbances that occur in the transportation world. It may not be out of place therefore, to again call attention to the absurdity of such contests, particularly in connection with railway rates.

It should be borne in mind that a railway corporation has no personality. It is without feeling and consequently devoid of sentiment. It is simply an aggregation of capital put to use for the purpose of returning to its contributors an adequate compensation therefor. Anything that adds to its net earning capacity is in line with the purpose of the organization, and anything that detracts therefrom is opposed thereto. In the physical operation of a railroad it is often wise to incur a heavy initial expense if thereby a reduction of operating expenses sufficient to justify the additional capitalization may be effected. So it is sometimes good policy to buy up a competing line, particularly where no public necessity exists for its separate maintenance as was the case with the West Shore and the Nickel Plate roads. In such instances and others that might be enumerated, the outlay partakes of the character of an investment and is wholly justifiable.

In the case of a rate war, however, the conditions are entirely reversed. The question is not one of additional outlay, but reduced revenue, and the fatal thing about it is that what is thus lost not only can never be regained, but is no value as insuring against further loss, or contributing to better conditions. All talk of the necessity of such contests for the purpose of "clearing the atmosphere," "upholding a principle" or "demonstrating the power of self defense," is the veriest nonsense. A rate war never yet settled anything, the problems and difficulties at the end being precisely those in existence at the beginning, and the settlement then reached might as easily have been accomplished before a single rate was reduced, as after thousands of dollars had been wasted if only the men in charge had been possessed of the same spirit at the first as at the last.

In view of the costly experience of the past, it may be seriously questioned if the accepted theory of rate control operative upon the railroads of this country, is not altogether wrong. Under the present theory, traffic officials are held responsible for earnings, and it is by no means an uncommon experience for such officials when for any reason traffic receipts fall off, to be asked by their superiors, why such is the case, and sometimes to be told that the matter must be remedied. Traffic officials are also ambitious, and the less experience they have, the more convinced are they that their reputation for ability depends upon the amount of tonnage they can secure rather than upon the amount of money they are able to contribute to the paying of dividends; and so it happens that having the power, there are few men who are able to rise superior to the conditions in which they find themselves and ignore both the spur of their superiors as well as of their own desire for notoriety, in the calm assurance that net earnings will prove a sufficient answer to both.

In view of such a condition, thoughtful students of the railroad problem are becoming convinced that the rate-making power should be wholly divorced from the traffic department. It is not so apparent, however, through just what medium it should be exercised. It is probable that the most natural solution would be the assumption by the directors of this most important function, but such an assumption would involve the more active participation in the affairs of the railroads than is now usual with this class of officials. Another suggestion is that the rate-making power be placed in the hands of disinterested parties employed for the purpose: men who, while sufficiently well informed in railroad affairs, and particularly in respect of the principles that should govern in the making of rate schedules, should be responsible only to the directors of the road. Certain it is that whatever plan may be adopted for the future, the record of the past furnishes abundant evidence of the futility of endeavoring to unite the rate-maker and the rate-user in one person. Such a

proceeding is somewhat akin to conferring upon a commercial traveler absolute control of prices at which to sell goods and then demanding that sales shall aggregate a sum at least equal to those of a corresponding period for the preceding year. Getting traffic is one thing, and getting traffic at paying rates is quite another; but, opposed as it may seem to the practice on some roads, the latter is likely to be more satisfactory to those who own the roads than the former.

FACTS AND FANCIES.

The New York, New Haven & Hartford Railroad Company is rapidly polishing and perfecting its system. This company was originally so happily chartered that it was obliged to pay all it earned over 10 per cent dividends to the state. With its elegant monopoly of New York and Boston travel it generally does earn annually much over this 10 per cent but to avoid giving the surplus to an unappreciative state it spends it all in betterments, and charges most of it to operating expenses. The result is, that improvements are constantly going on, and that this road will in time reach a degree of perfection exceeded by none. It is no doubt true that the New York, New Haven & Hartford is today spending more money for betterments in proportion to its mileage than any railroad company in the country. The four tracking and straightening between New York and New Haven is approaching completion, as well as the total abolition of grade crossings, the whole track and yard system at Bridgeport will soon be rebuilt, the grade raised and a number of new bridges be required. Then, since the acquisition of the control of the New England Railroad, the New Haven is running 5 hour trains between New York and Boston via Middletown and Willimantic only two stops being made about midway between the two great cities. This train then passes onto the New England tracks at Willimantic, Conn., and runs over these for 80 miles returning to the New Haven, Providence division tracks at Dedham and entering the Park square, Boston station. The distance by this road is only 212 miles and is much shorter than by any other. The run is easily made with only two stops in 5 hours, and after the work now in progress on the Air Line division between New Haven and Willimantic is completed it can be easily made in less than four hours. This division was built by the mile and was very crooked with heavy grades and reverse curves, and crosses several deep gulches on very high and spidery looking trestles. The New Haven company is now spending a vast sum on this division straightening the curves and shortening the road, the plan being to save over four miles on this division of 50 in all. This will shorten the total distance to Boston to 208 miles. Then the entire division will be double tracked, the heavy grades taken out and the old single track bridge over the Connecticut from Middletown to Portland, Conn., replaced with a strong double track bridge. The high trestles are also to be filled or avoided, and when all this is done, and the New York division four tracks are completed, the run from New York to Boston of 208 miles can be made in 3½ hours, with one or two stops. If this is done it will bother the other routes of this company a great deal to keep up with this time, and it is probable they will be left to take care of the principal way business between the two great cities, the Air Line route being used for through passengers only.

The New Haven company is also hard at work elevating its four tracks into Boston, from out near Dedham to the Boston & Albany crossing. This work is almost finished, the elevated tracks now being in use and it is of the most substantial nature, costing more than a million of dollars. In order to ascertain how much trouble and risk was avoided by the expenditure of so much money, a watch was set and a correct record made of the traffic and delays at these street crossings. At the grade crossings of the eleven streets 85,107 persons crossed over the tracks in 24 hours and 12,452 vehicles or a total of 97,559 of both, showing the number of "things" that might have been struck by the company's trains. The gates at these 11 streets were down, closing the street to the traffic, a total of 41 hours and 47 minutes or an average of 3 hours and 48 minutes each in every 24 hours. Thus 11 of the south end streets of Boston were closed to 85,107 persons and 12,452 teams for an average of 3 hours and 48 minutes each 24 hours and the streets might as well for that time, not have been there. These streets were partly residence and partly suburban business, and not streets of heavy traffic as compared with the down town commercial streets. The relief to the

engineers of this road in having 97,559 less objects moving on the track and then off again in front of them is easily to be conjectured. This is what this company, gained by its expenditure and trouble.

From the Boston & Albany crossing the tracks of this Providence division will pass down to the new South Union station at the side of the present Boston & Albany tracks, below grade, and when the new station is completed there will be but few grade crossings left anywhere in the limits of the city of Boston. Thus when the New York, New Haven & Hartford finishes all of the improvements it is now engaged in (and the ground is now being cleared for the South Union station) it will be indeed one of the most complete and finished railroads in the world with handsome stations everywhere. This also shows what a comfortable thing the sole monopoly of a guaranteed business is to "have in the house." Does anyone suppose that in the energetic west, if one railroad had an individual "cinch" on all the traffic between a city of 3,000,000 people and one of 700,000 it would be allowed to enjoy it serenely without competition year after year? It is certain that in such a situation out west there would have been at least six competing roads by now and none of them would have been able to go in for three million dollar improvements even if they kept out of a receiver's hands.

Political interest is at present very much alive among the railroad men of the east, and many what might be called variegated railroad political clubs have been formed. These are composed not of men of any special political parties but of patriots, who have rallied from all of the old parties to the defense of their common country. The railroad employes of the United States are an intelligent lot of men, any one of whom may become a railroad president if he has it in him. I do not believe that these men want anyone president of the United States who declares for anarchy and who proudly boasts that if elected he will not carry out the provisions of the constitution of the United States. All men who are respectable, who have law and order, and who want permanent employment and to rise in their chosen profession, know that if they are to live they must have employment, and if they have employment the trains must be kept moving. They believe that it is better to have everything on wheels moving and everyone busy, than to have stagnation with sidetracks full of empties. They see that these thousands of empties mean so many less train crews and so many less yard men to be employed. The railroad men as we know them, and believe in them, and have to think of them, are a class, many of whom own their homes on the line of road upon which they are employed, they are men who are striving to rise in their calling and who know that if the road stops that all their prosperity would stop with it. That to operate railroads and keep commerce moving, the trains must be kept going, and cannot but believe that "government by injunction" is greatly preferred by them to no government at all, which means to them no work, no pay, no comfort and no domestic happiness.

THE TRACKWALKER.

THE VISIT OF PRINCE HILKOFF.

As previously announced in these columns, Prince Michael Hilkoff, Imperial Minister of Ways and Communication of Russia, arrived in San Francisco, October 7. He was accompanied by his son, his technical engineer, Balchakoff, and his secretary, Lieut. Gregoire Tschertkoff, of the Life Guards. Prince Hilkoff was received by Major J. G. Pangborn, who had made all arrangements for his entertainment in this country, Mr. C. F. Crocker, first vice president of the Southern Pacific Railway, and other officers of that company. He arrived in Chicago Tuesday morning, October 13. The intervening week had been pleasantly and profitably spent in the inspection of the Southern Pacific, Rio Grande Western, Denver & Rio Grande and Atchison, Topeka & Santa Fe Railroads. Special trains were provided by these companies and every facility given to the distinguished visitor, whose only regret was that his time was so short. Dispatches from St. Petersburg made it necessary for him to cut his stay in this country short by one week, and the previously arranged program was therefore materially modified. At Topeka the shops of the Atchison, Topeka & Santa Fe road were very carefully inspected. Prince Hilkoff and his staff found them to be exceedingly interesting, and were especially pleased with the extensive installation for the use of compressed air. Before arriving at Chicago the prince desired to visit the drainage canal. A party was accordingly made up under the charge of Willard A. Smith, consisting of the Drainage Canal trustees and engineers, viz: Mr.

Bernard A. Eckhart, president of the board, Mr. Frank Wenter, Mr. Isham Randolph, chief engineer, Assistant Chief Engineer Johnson, Mr. Melville E. Stone, president of the Associated Press, Baron de Schlippenbach, Russian counsel at Chicago, Mr. D. H. Burnham, architect, Mr. H. B. Stone, president of the Chicago Telephone Co., Willard T. Block of the Siemens & Halske Electric Co., and Mr. C. F. Street of the RAILWAY REVIEW, and Mr. Hungerford of the Pullman Co. The party left on the Santa Fe road Monday evening, the car being set on the side track at Joliet, where the prince's party was met at 7 o'clock the next morning.

At Kansas City Prince Hilkoff and party had taken a special train sent to that point by the Pennsylvania Railroad Co., and which they are to occupy until their arrival in New York. The special was accompanied by Mr. J. J. Frey, general manager; Mr. J. Dunn, chief engineer; W. F. White, passenger traffic manager; John Player, superintendent of motive power; and C. F. Ressegue, division superintendent of the Santa Fe road. At Corwith Station they were also met by Mr. L. F. Loree, general manager; S. P. Bush, superintendent of motive power; and C. H. Walton, division superintendent of the Pennsylvania Lines; and George F. Brown, general manager and C. A. Garcelon, general superintendent of the Pullman Co.

The most important points of interest on the Drainage Canal were visited and especial interest was taken in the controlling works at Lockport. The party arrived in Chicago at the Pennsylvania station at 11 o'clock a. m., and proceeded in carriages to visit, in order, the center station of the Chicago Telephone Co.; one of the new high buildings in course of construction; the Rookery (as a modern office building) and thence to the Chicago Club on the invitation of Mr. Geo. M. Pullman. The luncheon given by Mr. Pullman was attended by a number of Chicago railroad managers, among them being Mr. T. B. Blackstone, president of the Chicago & Alton; Mr. Geo. B. Harris, vice president of the C. B. & Q.; M. J. Carpenter, president of the C. & E. I.; Roswell Miller, president, and Geo. R. Peck, general counsel of the C. M. & St. P., and Messrs. W. G. Purdy and W. H. Truesdale, vice presidents of the Chicago, Rock Island & Pacific; T. H. Wickes, vice president of the Pullman Co.

After luncheon the party visited the town of Pullman by special train provided by the courtesy of the Illinois Central Railroad Company. The works of the Pullman Company and the principal points of interest in the town were rapidly visited, and the celebrated world's fair train was inspected. On the return trip the party left the cars at Midway Plaisance and took carriages for a drive through the park and boulevards, and stopping for a pleasant reception at the residence of Mr. Pullman, after which the party went to the Auditorium Annex. In the evening a small dinner was given to the prince and party at the hotel by the Pennsylvania Railroad officials, and the special train of the Pennsylvania Railroad left for Cincinnati at 10 o'clock p. m.

The program for the remainder of the prince's trip was briefly as follows: One day at Hamilton and Cincinnati, visiting several of the principal manufacturing establishments and engineering works. One day at Pittsburgh, visiting especially the works of the Westinghouse Electric Company, the Westinghouse Air Brake Company and the Carnegie Company. One day at Altoona, inspecting the shops of the Pennsylvania Railroad. One day at Philadelphia, inspecting the leading manufacturing establishments. On arriving at New York the party will take a special train on the New York Central Railroad, whose guests they become, for Niagara Falls. Monday will be spent in Buffalo, and the party will arrive in New York City on Tuesday morning, sailing for England by the Wednesday morning steamer, Oct. 21. Maj. Pangborn will accompany the party through to St. Petersburg on its return. Special trains have been provided in England and on the continent.

Our readers have been pretty well posted in advance of the pleasant characteristics of Prince Hilkoff. It may be said without exaggeration that all who have met him in this country were surprised at the wonderful ability and information of the prince, and his entire freedom from self-consciousness and disagreeable mannerisms. The wonderful ability of the man and his keen insight and ready wit were a constant surprise to those who entertained him. It was very apparent that he had risen to the high position which he now occupies through his individual ability, and that he is the right man in the right place. He has keenly observed everything relating to transportation and engineering matters in this country and has a most retentive memory. We cannot but believe that this visit of inspection will result in the still further introduction of American

railway ideas in Russia, and that American manufacturers will, as a result, find the most important market in that country.

HARDNESS TESTS FOR METAL.

A convenient and simple test for ascertaining the relative as well as the absolute hardness of the various metals has long been needed and a valuable addition to the literature upon the subject appeared a short time ago in a German contemporary, for the translation of which we are indebted to the "Iron and Coal Trades' Review." The author of the article is Herr A. Foppl, and his communication on the subject is as follows:

I was recently called upon, by a firm of safe manufacturers, to submit two steel plates of about 6 millimetres (0.236 in.) thickness to a comparative test of their hardness; that is, of their capacity to resist the drill, file and other tools.

I endeavored at first to get an approximate idea of their toughness by ascertaining the elongation limit of both steels, for the resistance against manipulations must naturally be the higher the greater the tension which the material can undergo before it permanently changes form. The elongation limit, however, cannot always be sharply established, and the values which I obtained for both steels did not differ sufficiently from each other to satisfy me as to their absolute reliability.

In this difficulty I remembered a proposal which the great physicist, Heinrich Hertz, had made for the determination of the hardness of a body. I caused to be taken from each plate two pieces, about 15 millimetres (0.590 in.) wide and 25 millimetres (0.948 in.) long, which were cylindrically drawn and fine polished. The radius of the cylindrical surface in all the pieces was 20 millimetres (0.787 in.) Two pieces from the same plate were then laid, with their cylindrical surfaces crosswise, upon each other, so that they only touched at one point. Then, by a gradually increasing force, they were pressed together until a permanent impression could be detected. The harder a body is the greater (with equivalent co-efficient of elasticity) the pressure which must be expended to this end, and this can therefore, without further ado, be utilized as a criterion of the hardness of the body.

The experiment succeeded perfectly. With the harder steel a definable impression was only reached at a pressure of 3,500 kilogrammes (7,700 lbs.), while with the softer metal, an impression was apparent at 350 kilogrammes (770 lbs.), and a pressure of 700 kilogrammes (1,540 lbs.) induced a permanent flattening of 2.7 millimetres (0.105 in.) in diameter.

This simple method of testing hardness has several important advantages. In the first place, in the operation both tool and work piece are of the same metal which it is desired to test. Then all the conditions of the test are exactly registered, so that they can easily be reproduced at any place in the same manner.

In my laboratory in future I shall subject every kind of metal which is sent to me for investigation of its general qualities to the test for hardness I have mentioned—namely, crossed cylinders of 20 millimetres (0.787 in.) radius. Besides the two steels, I have since tested two cast irons and a soft copper for their hardness.

With the first cast iron, of 1,390 kilogrammes (3,058 lbs.) per square centimeter (0.3937 in.) strength of extension,

7,480 kilogrammes (16,456 lbs.) strength of compression, and 1,000 tons co-efficient of elasticity, the first impression was reached at 220 kilogrammes (484 lbs.); with the second, of 1,570 kilogrammes (3,454 lbs.) strength of extension, 8,300 kilogrammes (18,260 lbs.) strength of compression, and 1,100 tons co-efficient of elasticity, the first impression was attained at 250 kilogrammes (550 lbs.) The copper sustained a pressure of 31 kilogrammes (68.2 lbs.) only, this sufficing to induce the first permanent impression.

It is a question of railway authorities if it would not be advantageous for them to avail themselves of this simple test for hardness in taking deliveries of rails, etc., as the wear of a steel rail can easily be determined from that quality of the metal which is investigated in this test.

Respectfully Referred to Timid Advertisers.

Bryan may be elected in November (but probably he will not).

But if he is:

The world will not stop in its movement. It will continue to go round and round, like the wheels in some street orator's head, only in a more regular and orderly manner.

The sun will continue to rise and set; the moon, too, will shed its radiance and the stars will illuminate as is their wont.

Water will continue to run down hill and trees to grow up hill.

People, also, will continue to breathe and to eat, and drink and to wear clothes.

The corn and the wheat, the potatoes and the tomatoes, and several other things, will continue to grow.

There will even be marrying and the giving in marriage, and occasionally a baby will be born.

In a word, there will be things to attend to just the same as there are now, and somebody will have to attend to them.

Let's proceed to business and not make fools of ourselves. Some people are saying now that they will refuse to play any more if things don't go to suit them in November. If they stick to their threats they will be surprised to find how many other people there will be to do the playing that is necessary.—[Age of Steel.]

A LOCOMOTIVE SHOP, TRAVELING CRANE 5,000 POUNDS CAPACITY.

A convenient and comparatively inexpensive traveling crane has recently been erected over the pits in the locomotive erecting shop of the Chicago & Northwestern Railway, at West Chicago, which is illustrated and described through the courtesy of Mr. Robert Quayle, superintendent of motive power and machinery, and M. E. Herr, assistant superintendent of motive power and machinery, of that road. The erecting pits occupy the east half of the locomotive shop and cover a space 526 ft. in length by about 40 ft. in width. This space is divided into two sections by the screw hoisting apparatus at the center which makes it impossible to use continuous rails for the

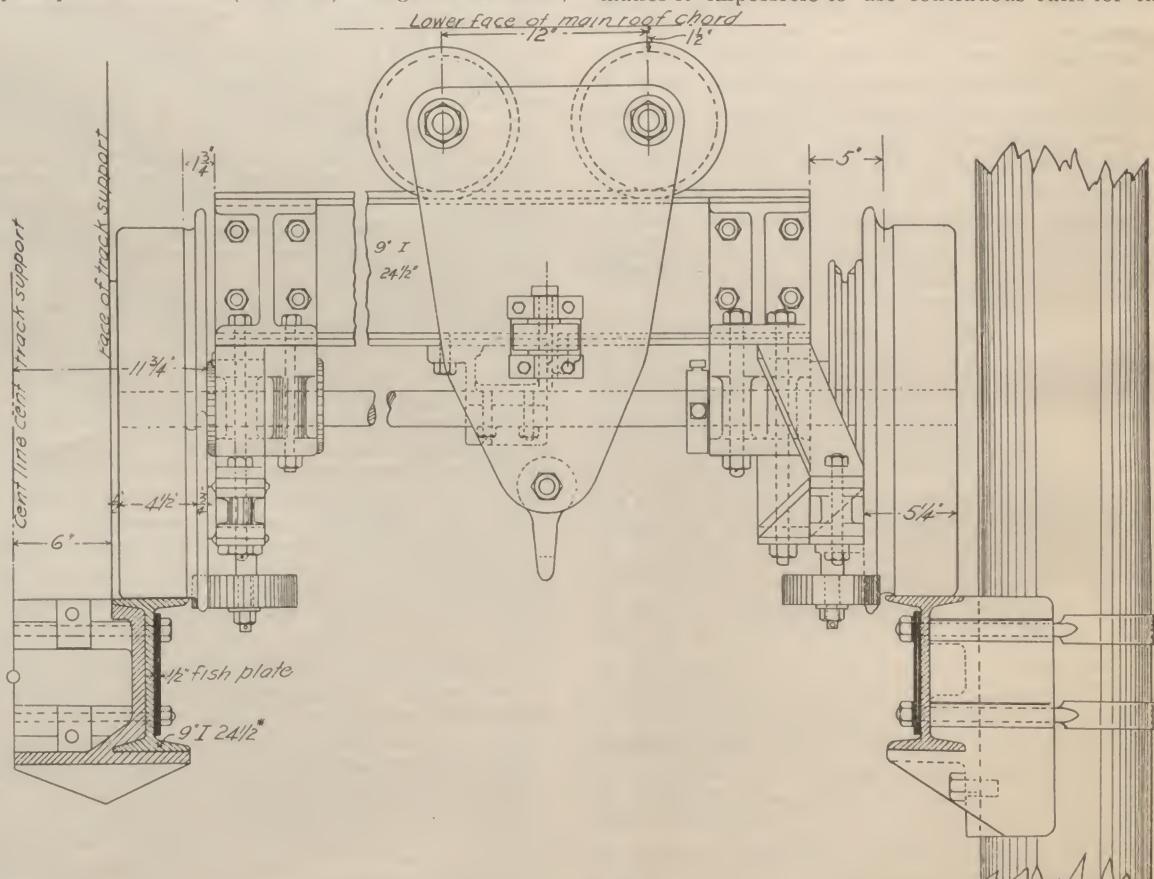
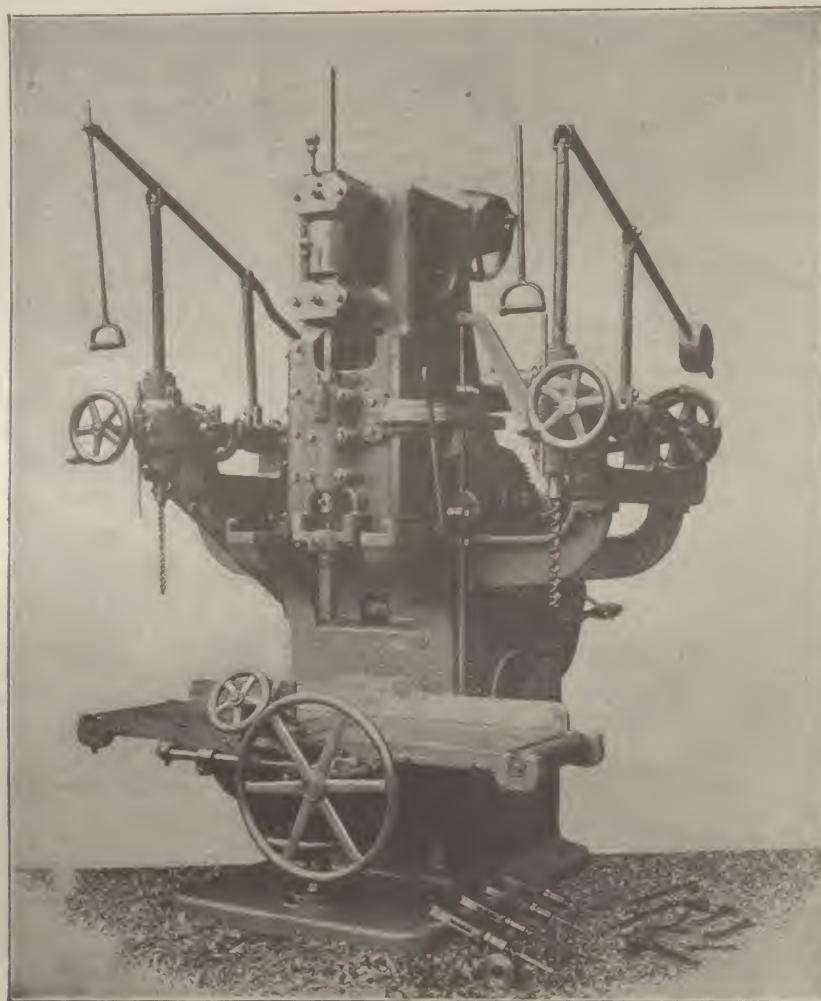


FIG. 1.—ELEVATION OF CRANE SHOWING SUPPORTS.

A VERTICAL HOLLOW CHISEL CAR MORTISING MACHINE.

The machine shown in the accompanying illustration has been placed upon the market by J. A. Fay & Co., 229-319 W. Front street, Cincinnati, Ohio. It is adapted to heavy mortise work such as is required in car and wagon building and is a powerful machine. In the design attention has been specially directed to the production of a strong simple and efficient mortiser which would not be liable to the delays incident

Each machine is provided with a shop number and a number is placed on each casting, by which they may be identified in ordering supplies. The counter shaft has 14 x 6 in. tight and loose pulleys, and makes 800 revolutions. When desired this machine can be furnished with a steel traveling bed of any required length, and having both power and hand feed, adjustable stops for gaging the distances of travel, and quick-acting eccentric clamps for holding material firmly in position.



A VERTICAL HOLLOW CHISEL CAR MORTISING MACHINE.

to stopping the machine for repairs, and one which would cut mortises which do not require cleaning out. The machine also has auxiliary boring attachments.

The frame of the machine is heavy and is made in a cored form with a wide base, giving good floor surface, and carrying a cored housing, and with it the chisel-ram, the auxiliary boring attachments, and the timber-supporting table. The housing is gibbed firmly to the frame, with provision for taking up wear, and has a lateral movement, actuated by a lever, for moving the chisel to its required position above the timber. It is counterbalanced by a weight and lever, and supported on rolls which reduce the friction of operation to a minimum. The chisel-ram is gibbed to the housing, and carries the boring spindle that prepares the material for the chisel thrust; this boring spindle runs in a long, self-oiling bearing in the frame, and through the sleeve the bearings and the pulley on the housing where the power is applied. A self-adjusting binder is provided for keeping the proper tension on the belt that drives the boring spindle. Stops are provided to regulate the vertical travel of the ram for the depth of mortise and also for the lateral movement for its width. The vertical movement of the ram is 16 in. and the extreme lateral motion, with the housing, is 14 in.

The table for supporting the material is 4 ft. 6 in. long. It is provided with stops to regulate the travel to the length of the mortise required and is operated by a handwheel with a rack, and pinion. It has an adjustable clamp for holding the material firmly in position, and also a vertical adjustment. The reciprocating motion of the chisel-ram is produced by reversing friction gearing. The countershaft is placed above the machine: driving the friction by two belts, and also driving the boring spindle on the frame, and the auxiliary boring attachments. The auxiliary boring attachments are placed one on each side of the frame, at such distance from the chisel as will permit of adjusting them to an angle of thirty degrees in either direction. These are convenient for joint-bolt boring, and save much handling of material. The spindles have a vertical adjustment of 20 in., and a lateral adjustment of 12 in.

The Schoen Brake Shoe Company has just issued a new ten page pamphlet, standard size, 6 by 9 inch, which is devoted to the illustration and description of the Schoen pressed steel brake shoe. The results of the tests of brake shoes by the committee of the Master Car Builders' Association are quoted and arguments are presented to show the advantages of this type of shoe as to wearing qualities and also in the work of stopping trains. The thinness to which the pressed steel shoes may be worn is urged as an additional reason for their superiority. This adds to the length of service and constitutes a means for considerable saving in outlay. The shoes are made of low carbon steel of mild quality, and are forged into the forms now in use with accuracy by means of hydraulic pressure. The manufacturers have had three years' experience in this work and are prepared to furnish brake shoes at short notice. The general office of the company is in the Betz, building, Philadelphia.

TECHNICAL MEETINGS.

The annual convention of the American Society of Mechanical Engineers will be held at the house of the society, 12 West Thirty-first street, New York City, December 1st to 4th, 1896. Secretary, F. R. Hutton.

The Engineers' Club of Cincinnati has a monthly meeting on the third Thursday in each month, at 7:30 p. m. at the Literary Club, 24 West Fourth street, Cincinnati, O. Address P. O. Box 333.

The Engineers' Club of Minneapolis holds its meetings on the first Thursday in each month, at Public Library building, Minneapolis, Minn.

The Engineers' Club of Philadelphia meets on the first and third Saturdays in each month, at 8 p. m., at the house of the club, 1122 Girard street, Philadelphia, Pa.

The Civil Engineers' Club of Cleveland, meets on the second and fourth Tuesdays in each month, at 8 p. m., at the Case Library building, Cleveland, Ohio.

The Association of Engineers of Virginia, holds its informal meetings on the third Wednesday of each month from September to May inclusive, at 8 p. m., at 710 Terry building, Roanoke, Va.

The Western Railway Club of Chicago, holds its meeting on the third Tuesday of each month.

The Central Railway Club meets on the second Friday of January, March, May, September and October, at 2 p. m., at the Hotel Iroquois, Buffalo, N. Y.

The Denver Society of Civil Engineers meets on the second and fourth Tuesdays in each month except July, August and December, when they are held on the second Tuesday only, at 36 Jacobson building, Denver, Colo.

The Western Society of Engineers holds its regular meetings for the transaction of business and the reading and discussion of papers on the first Wednesday of each month except January.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8 p. m., at the House of the Society, 127 East Twenty-third street New York City.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each month, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Tuesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on the third Thursday in each month, at 8 p. m., at 12 West Thirty-first street, New York City.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m., at the St. Paul Union Station, St. Paul, Minn.

The North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Engineering Association of the South meets on the second Thursday of each month at 8 p. m., at the Cumber and Publishing House, Nashville, Tenn.

The Railway Signaling Club holds its meetings in Chicago, Ill., on the second Tuesday of January, March, May, September and November. G. M. Basford, secretary, 818 The Rookery.

The Southern & Southwestern Railway Club holds its meetings on the third Thursday of January, April, August and November, at the Kimball House, Atlanta, Ga.

The Western Foundrymen's Association holds its meetings on the third Wednesday in each month, at the Great Northern Hotel, Chicago, Ill.; secretary, A. Sorge, Jr., 1533 Marquette building.

PERSONAL.

Mr. J. S. Phillips has been appointed traffic manager of the Gulf, Beaumont & Kansas City road with headquarters at Beaumont, Tex.

Mr. W. H. Vandegrift, for years superintendent of the Cleveland, Cincinnati, Chicago & St. Louis, is now general agent of the Wisconsin Central at Manitou, Col.

Mr. O. Atkisson has been appointed commercial agent of the San Antonio & Aransas Pass with headquarters at Galveston, Texas. Mr. Atkisson was formerly with the Missouri Pacific.

Mr. H. Walter Webb, third vice president of the New York, Central & Hudson River Railroad Company has been appointed temporary receiver of the Ogdensburg & Lake Champlain Railroad.

It is reported that Mr. H. R. Rogers, commercial agent of the Baltimore & Ohio at Cleveland, will look after the business of the Central States Dispatch and the Continental line at Cleveland.

At the annual meeting of the board of directors of the Seaboard Air Line, Mr. Basil B. Gordon of Virginia was chosen to fill the vacancy caused by the death of Mr. Enoch Pratt. All the other directors were re-elected.

Mr. Smith D. Pickett has been appointed general agent for the Southern Railway at Jacksonville, Fla., succeeding the late Mr. C. E. Minetree. Mr. Pickett will be succeeded at Macon by Mr. D. E. Williams now at Columbus.

On Oct. 15, Mr. W. H. Young contracting agent for the Columbus, Hocking Valley & Toledo at Toledo, will retire and the office will be abolished. This is understood to be the result of the general policy of retrenchment on the road.

Mr. J. S. Bartle, assistant general freight agent of the Burlington lines in Missouri, has been appointed general freight and passenger agent of the Indiana, Illinois & Iowa Railroad, with headquarters in Chicago. He will assume his duties Nov. 1.

The Grand Trunk has closed its commercial agency at Buffalo and Mr. Charles Clarke, who has held the position, goes to New York as state agent of the company; Mr. Albert Mullins, late traveling freight agent of the company, goes to Grand Rapids with the title of Great Eastern fast freight line agent.

A number of changes have been made on the Great Eastern freight lines: Mr. W. J. Hunter, formerly city soliciting agent at Detroit, Mich., promoted to traveling freight agent at Battle Creek, vice Mr. S. R. Eaton, resigned. Harry S. Miller, formerly agent of the Grand Rapids, appointed to fill Hunter's place.

Mr. John King has been appointed general road master of the Peoria & Rushville division of the Chicago, Burlington & Quincy succeeding Mr. C. H. Cuyler who has been roadmaster of the Peoria division for thirty-five years past. Mr. James Langton has been made roadmaster of the Hannibal division.

Mr. Edward Sands has been appointed New England agent of the Plant system of railways, with office at 207 Washington street, Boston. Mr. Sands is a native of Maine, his former home having been in Saco, and he has for many years been prominently identified with the transportation interests of New England.

The Gulf, Brazos Valley & Pacific road is now fully organized and the following are the officers: Mr. W. A. Squires, president; E. J. Gurley, of Waco, Tex., vice president; C. B. Preston, of Mineral Wells, treasurer; H. M. Taylor, of Mineral Wells, secretary and general manager; G. B. Gurley, engineer, and ex-Governor R. B. Hubbard, of Tyler, general solicitor.

Ex-Governor Levi K. Fuller died this week at his home in Brattleboro, Vt., aged 55 years. For over twenty years he has been vice president of the Estey Organ Co., being closely identified with the growth and success of every department of the company's business. He had great mechanical genius which manifested itself at an early age. When sixteen years old, Windham county, Vt., agricultural society awarded him a prize for a steam engine improvement. Ex-Gov. Fuller was a member of the American Society for the Advancement of Science and of the American Society of Mechanical Engineers. He has held many important offices, both town and state, and was elected governor of the state in 1892.

Mr. Robert Neilson, general superintendent of the Philadelphia & Erie division of the Pennsylvania Railroad and the Northern Central Railway, died very suddenly at his home in Williamsport on Monday night last from an acute attack of neuralgia of the heart. Mr. Neilson first entered the railway service in 1863 as a rodman on the Philadelphia & Erie Railroad, and continued in that capacity until 1865, when he became resident engineer of the Middle division of that road. From January, 1868, to January, 1870, he was resident engineer of the Middle division of the Pennsylvania Railroad, from which position he was promoted in 1870, to the superintendency of the Western division. In 1874 he was appointed superintendent of the Elmira and Canandaigua division of the Northern Central Railway, and in 1881 was promoted to the position of general superintendent of the Philadelphia & Erie division of the Pennsylvania Railroad, and of the Northern Central Railway lines north of Harrisburg. In 1883 his sphere of action and responsibility was enlarged to embrace all the divisions of the Philadelphia and Erie division, and the entire Northern Central Railway, which important position he held at the time of his death. Mr. Neilson was exceedingly popular with the employees who served under him, and his untimely death will be keenly felt in every branch of a service in which he had spent a conspicuously useful life. He was 59 years of age.

RAILWAY NEWS.

Charleston & Western Carolina.—The receiverships of the Port Royal & Augusta and Port Royal & Western Carolina roads were terminated at midnight Oct. 3, and the property turned over to the Charleston & Western Carolina the reorganized company. The combined length of the roads is 247 miles. Mr. J. B. Cleveland receiver of the Port Royal & Western Carolina is president of the new company.

Chicago & Eastern Illinois.—It is understood that track-laying has already begun on the extension of the Chicago & Eastern Illinois between Shelbyville and St. Elmo. This link when built will form the new St. Louis and Chicago line in connection with the Vandalia.

Chicago & Northern Pacific.—The date of sale for the Chicago & Northern Pacific road has been fixed for November 17, and will take place from the steps of the Cook county court house. The upset price has been fixed at \$7,500,000. Under the order of the court the sale will be subject to the mortgage for \$650,000 to the city of Chicago and to the bonds of the Chicago Great Western R. for \$394,000.

Columbus, Hocking Valley & Toledo.—A general lien mortgage has been filed with the Delaware county recorder, by C. O. Hunter, general solicitor of the Columbus, Hocking Valley & Toledo road. This mortgage is given to the Guaranty Trust Co., of New York, trustee for \$30,000,000 of 30,000 semi-annual 4 per cent gold bonds, 22,000 of which are designed to retire eight series of outstanding bonds. The remainder to be used for the construction of branch work.

Great Northern.—Tracklaying on the Crookston-Halstad branch of the Great Northern was finished into Crookston on Oct. 7. The work of surfacing and ballasting will be pushed promptly and trains will be running into the city by Oct. 20. The opening of this line will give Crookston direct rail communication with Fargo and will afford shipping facilities for a wealthy farming country which has heretofore been isolated from the railroad. A number of new towns have sprung up along the line which are rapidly growing.

A somewhat peculiar case has just been settled in the courts of Minnesota, in which judgment was obtained against the Great Northern road by the village of Hinckley for the sum of \$16,200. In 1886 Hinckley voted \$12,000 in aid of the Kettle River R. The bonds were issued, the road built, operated three years and abandoned. The company went out of business. In 1891 the Eastern Railway of Minnesota, a part of the Great Northern system,

tore up the tracks and actually carried off everything but the ground. In 1894 Hinckley brought an action against the Kettle river company for damages for breach of contract in not operating the road, and recovered judgment for \$19,000. This judgment could not be collected, so damages against the Eastern Railway of Minnesota for the value of the property stolen were recovered. This road is one of the proprietary lines of the Great Northern, having trackage right over the latter road and the use of terminal facilities in Minneapolis and St. Paul under a 99 year lease.

Green Bay & Western.—It will perhaps be remembered that at the time of the sale of this road last May that Mr. William S. Mowry, representing the first mortgage bondholders to the amount of \$105,000, refused to go into the reorganization agreement unless paid the full amount of their holdings with interest. On October 12 the United States court, in its administration of the affairs of the road, denied the motion of Mr. Mowry, representing the original first mortgage bondholders, for permission to reopen the testimony and to cross-examine the witnesses who have testified, thus scoring a sweeping victory for the Farmers' Loan & Trust Co.

Illinois Central.—The recent purchase of the Illinois Central—the Chesapeake, Ohio & Southwestern—is being put in first class condition. The trackage has been practically relaid between Louisville & Memphis, 75 lb. rails being used therefor. Sixteen heavy passenger locomotives are ordered, eight of which are ready for the road and will be used on the Louisville & Memphis division, which part of the line has also been newly ballasted with stone and gravel.

Kentucky Midland.—By order of the Franklin county circuit court, the Kentucky Midland R. is to be sold on the first Monday in January, 1897. This is the third order of sale and the upset price has been placed at \$150,000 now against \$320,000 the first time and \$250,000 the second time. At both previous sales no bids were received. The road is 40 miles long and was built at a cost of \$1,000,000.

Louisville, New Albany & Chicago.—The committee of the bondholders of the Monon road, composed of Messrs. Frederick P. Olcott, Henry W. Poor, and Henry C. Rouse has prepared a plan of reorganization which contemplates the formation of a new company to be called the Chicago, Indianapolis & Louisville R. Co., which shall acquire the existing property assets and the Indianapolis terminals, Lafayette shops, Kentucky bridge bonds, equipment, etc. This plan will reduce the fixed charges of the new company to \$698,450 for interest and \$210,000 for rentals, against an average net earning capacity for the last five years of \$1,093,308. The company shall issue \$15,000,000 in bonds, \$5,300,000 to take up existing division issues, \$6,109,000 to take up the consols 6s, general 5s, and equipment bonds, \$1,500,000 to be sold for cash to a syndicate, and the balance \$2,091,000, to be deposited with a trustee to be used for betterments, etc., in amount not exceeding \$400,000 per annum. In addition, \$5,000,000 in 4 percent non-cumulative preferred and \$10,500,000 in common stock will be issued. The existing preferred stock shall have the privilege of subscribing for an equal amount of common stock in the new company at \$7.50 per share, receiving, in addition thereto, new preferred stock equal to the amount of cash paid. The existing common stock shall have the right to subscribe at \$7.50 per share for an amount of common stock in the new company equal to one-third of the existing common stock, receiving with each subscription, in addition, new preferred stock equal to the amount of cash paid. The effect of these provisions will be as follows: Each \$100 of existing preferred stock will receive \$100 of new common stock and \$7.50 of the new preferred, paying therefor \$7.50 in cash. Each holder of \$300 of existing common stock will receive \$100 of the new common and \$7.50 of the new preferred upon payment of \$7.50 in cash. The existing divisional mortgages upon the main line and air line division are not disturbed under the plan. The committee requires that deposits of securities must be made prior to November 30.

Northern Pacific.—Although it was announced some time since that the Northern Pacific receivership was terminated, it is quite likely to be some time yet before the order discharging Messrs. Bigelow and McHenry is entered. It was supposed that all property covered by mortgages covered any, and all that the Northern Pacific Co. possessed or could in any way possibly acquire, and it has been sold, but there still remains in the possession of the receivers many thousands of acres of valuable lands unincumbered by direct mortgages, and which will have to be sold. These lands lay directly east of the Missouri river, and have been claimed generally by the creditors and stand as the only available assets of value to the general creditors. While the court has not yet been applied to by the receivers for instruction in disposing of this property, it is expected that when they do it will bring forth a lengthy petition from the holders of the Northern Pacific preferred stock that will call for long and complicated litigation, unless an amicable settlement can be reached. The preferred stockholders assert that by the reading of their stock certificates the preferred stock is made first lien upon the property. If the contention of the stockholders prevails there will be very little left for the general creditors after the stock has been satisfied.

Richmond, Nicholasville, Irvine & Beattyville.—As was noted in this column some weeks ago, this road was advertised for foreclosure sale on October 10 to satisfy a mortgage held by the Central Trust Co., of New York, but no bidders being present on that date the sale was postponed until some day next month. It is expected that at that time the road will be bought in by the bondholders and lienholders. The reorganization committee of the

Richmond, Nicholasville, Irvine & Beattyville road, consisting of Messrs. H. V. Loving, St. John Boyle and A. P. Humphrey has recently held a consultation with Mr. Geo. M. Pullman, who owns \$100,000 worth of the bonds of the road and the plan of the committee was discussed. Mr. Pullman declared that he was in favor of the reorganization of the road and its operation by the bondholders. Under certain conditions it said he will probably pool his bonds with the other bondholders.

Seaboard Air Line.—It has now been confirmed by interested parties, that the majority of the stock of the various roads composing the Seaboard Air Line has passed into the hands of Messrs. Thomas F. Ryan and Samuel Thomas of New York. The transaction also includes control of the Baltimore Steam Packet Co., which operates the "Bay Line" of steamboats from Norfolk to Baltimore in connection with the Seaboard Air Line. The deal will result in a termination of the rate war started by the Seaboard Air Line. Last spring Messrs. Thomas & Ryan purchased the Port Royal & Augusta and the Port Royal & Western Carolina roads, and are now operating them under the new name of Port Royal & Western Carolina R. Co. The understanding is that the Seaboard Air Line will be joined with this road and the Georgia Central which is also owned and controlled by Messrs. Thomas & Ryan.

Texas Midland.—The track of the Texas Midland was laid into Paris on October 10, but a heavy downpour of rain prevented the laying of switches and making the connections with the St. Louis & San Francisco. The rails with which the track is laid are 60 ft. long and weigh 70 lbs. to the yard. It is thought that the road will be opened for traffic on the 15th.

Western New York & Pennsylvania.—The annual report of the Western New York & Pennsylvania has just been made public and shows that the funded debt of the company including first, general and income mortgage bonds, is \$29,990,000; fixed charges, including interest on first and general mortgage bonds, on real estate mortgages, annual taxes, \$1,009,937. Under the plan of reconstruction the interest upon \$10,000,000 of general mortgage bonds did not become a charge upon revenue until April 1. The net earnings for 1895, after deducting only operating expenses, amounted to \$989,174.45, and the net earnings of 1896 with \$129,437.06 added to operating expenses formerly charged to betterment account, amounted to \$1,081,556.64, showing a comparative increase of \$92,382.19. During the year the company expended, for five new iron and steel bridges, \$17,000; the present coal trestle and dock, which cost \$60,000, need rebuilding on a larger scale.

Wheeling & Lake Erie.—In spite of the general depression in business circles the Wheeling & Lake Erie is making many improvements on its line among which is the addition of 1,200 ft. of dock at Toledo which will about double its capacity at that point. A new steel bridge has just been completed over the Lake Shore at Oak Harbor and a new span over the Maumee river has been swung in place. Work has begun on three new steel spans across the Sandusky river at Fremont, and at several other points on the road piling has not been filled.

NEW ROADS AND PROJECTS.

Indiana.—A report comes to us that the Cleveland, Cincinnati, Chicago & St. Louis Co. has a party of surveyors at present mapping out a line from Muncie to Richmond, Ind. For years neither the Pennsylvania nor the Big Four has attempted to open up new territory where the other has an established business, and it is said that if the Big Four builds into Richmond the Pennsylvania line will go to Muncie to even things up. The new extension of the Big Four will be 40 miles.

Minnesota.—A survey is about to commence for a new line 100 miles in length northwest from Deer river, through the almost unknown portions of the forests of Northern Minnesota. An exploring party has just returned and report the building of the line feasible. It is announced that the negotiations for money for the actual construction of the road will now be pushed. Among those interested in the project are W. B. Kellogg, of West Superior, and H. Fergraus. The name of the new line will be the Duluth & North Dakota.

New Jersey.—Notwithstanding injunction proceedings under which work was ordered to be suspended on the Ocean City Railway are still pending, construction has again been resumed. The line when completed is to be operated under a traffic agreement by the South Jersey R. and is expected to be an important adjunct to that line by assisting to put it on a paying basis. It is confidently expected that the net receipts during the summer months will be sufficient to operate the road for the balance of the year without creating a deficiency.

New York.—The New York & Brooklyn R. Co. has filed a certificate of incorporation in the county clerk's office both in New York and Brooklyn. The company is formed to operate a tunnel railroad between the two cities, and its term of life is 50 years. The length of the railroad is specified as two miles. The New York end is to be at a point near Broadway, and somewhere between Canal street and South Ferry. The Brooklyn end is to be near Fulton street, at a point between the city hall and the East river. The company is capitalized at only \$20,000, and the capital stock is all subscribed. It is divided into 200 shares of \$100 each.

Texas.—The Gulf & Brazos Valley Co. has completed its organization and all details of construction practically settled. The road will be built from Henrietta, Texas, where it will connect with the St. Louis, Oklahoma & Texas Air Line R. to Velasco on the gulf, passing through the towns

of Jacksboro, Mineral Wells and Waco. Twelve miles of the roadbed is said to be already graded.

Washington.—Work on the new Astoria & Columbia River road is progressing steadily and a large force of men is now at work grading between Astoria and Goble. The people along the line are sanguine about the completion of this road, which they expect will be open for through business some time in 1897. All difficulties appear to have been surmounted, and they claim that nothing further can stop the completion of the work.

INDUSTRIAL NOTES.

Cars and Locomotives.

The Louisville & Nashville is stated to be in the market for 300 gondola cars.

The United States Car Company is building five stock cars for Mr. J. C. Werden, Chicago.

The Green Bay & Western is asking for bids on 150 box cars. This is part of the lot of 500 to which reference has previously been made.

The Missouri Car & Foundry Company is bidding on 50 refrigerator cars for the Cudahy Packing Co.

President E. H. R. Green, of the Texas Midland Railroad Company, has a private car built by the St. Charles Car Company, of St. Charles, Mo., which is one of the finest in this country. It is called the "Lone Star State" and contains an office, two bedrooms, a bathroom, kitchen and dining room. It is finished in oak and plush and luxuriously furnished.

The Butler & Pittsburgh will soon be in the market for \$1,000,000 worth of equipment. It will shortly ask for bids for 25 locomotives, 400 cars, and 20,000 tons of steel rails.

The Stone, Coal & Lumber Freight Line of Atlanta, Ga., has increased its business to such an extent that it has recently made a contract with the Car Trust Investment Company of New York, for 50 coal and lumber cars, 50 freight cars and 100 coal cars.

The Chattanooga Car & Foundry Company, Chattanooga, Tenn., has a large contract on hand to repair a lot of iron cars for the Southern Railway.

The International Great Northern Railroad Company has determined to place new equipment on its line between St. Louis and Galveston, and has built a number of cars especially for this service. They are built on the drawing room plan, with 12 sections, and are supplied with buffets.

Buildings.

The increasing business of the Herreshoff Manufacturing Co., Bristol, R. I., necessitates an increase in the plant by the erection of a large building to the southward of the present machine shops. The new building, it is understood, will be used for a machine shop, in which engines are to be constructed, while the upper stories are to be occupied by several branches of the machinery and boiler departments.

The passenger depot of the Plant system at Savannah, Ga., which was totally destroyed by the recent wind storm, will be rebuilt. The freight depots and large warehouses at this place of the Central Railroad of Georgia, and Georgia & Alabama Railway, were partially destroyed by the storm—the roofs and walls being principally destroyed. These will also be rebuilt at once by the companies.

Workmen have begun the erection of the foundations for the engines, rolls, etc., at the Keystone Axle Works, Beaver Falls, Pa. It is not known when the plant will be put in operation.

The city architect of Chicago is at work on the plans for the new machine shops to be built by the city on Ashland avenue, south of Twenty-second street. Three buildings will be constructed on this site. There will be a machine shop two stories high, 80x125 feet, and a police department repair shop two stories high, 75x150 feet. These buildings will be constructed of red pressed brick. In addition to this there will be a storage shed of 25x150 feet, one story high, constructed of corrugated iron. The buildings will cost approximately \$60,000. Contracts for construction will be let in about three weeks.

The Augusta Southern Railroad Co. will, it is stated, shortly rebuild its shops recently burned.

It is stated that the Chattanooga & Augusta Railroad Co. has planned a union depot to be constructed in Chattanooga after the line is built. The depot is to be 800x400 feet in size if built.

It is reported that the Cambria Iron Co. will make improvements this year in its plant that will cost from \$500,000 to \$800,000.

The Pencoyd Iron Works of Philadelphia is preparing to erect another large addition to its plant, according to reports.

The Cincinnati Southern Railway Co. it is said, will shortly rebuild its shops recently burned at Somerset.

The Grand Trunk Railway will co-operate with the city authorities in an arrangement for the erection of a new grain elevator at Portland, Me., which is urgently needed in view of the increased capacity of the steamers which are now crossing the Atlantic. The amount required is \$200,000, which will be subscribed by the banks and the city of Portland under the guarantee of the company of the payment of interest at 4 per cent.

It is reported that a railroad depot may be erected on Broadway in St. Louis. The East End Improvement As-

sociation is interested in the matter. J. K. Cummings is vice president.

Bridges.

The Pencoyd (Pa.) Iron Works is making large shipments of iron to the Northern Pacific Railroad aggregating 250 car loads. The iron consists of structural material and is being moved in train loads via the Reading and Erie roads to Chicago, and from this city to St. Paul via the Great Western. October 1, 38 cars left Pencoyd in one train. The iron is to be used for repairing and renewing bridges on the Northern Pacific road.

Press reports state that the civic deputation to Ottawa on the bridge question claims to have the positive assurance of Premier Laurier and his colleagues that at the proper time the government will financially assist the project. It is said that the aid promised will be in the shape of a grant of 15 per cent of the total cost of the bridge, that is to say, if the latter reaches \$5,000,000 the government will give \$750,000 of the amount. It is expected that the city corporation will take stock in the company to the extent of \$250,000 and guarantee the interest on an issue of bonds to the extent of \$1,000,000.

It is stated upon good authority that the Pennsylvania Railroad will construct a new steel bridge in place of the old wooden one at Columbia which was blown down by the recent storm.

A petition will be presented asking for the construction of a bridge across Beaver creek, at Knoxville, Tenn., to cost \$2,500. Address the city clerk.

The Rapid Transit Co., at Waterloo, Iowa, is reported as about to let contracts for constructing four bridges on the Cedar Falls line. The largest one will be about 400 ft. long. It is to be of steel, and is estimated to cost \$15,000. The other three structures will be wood.

The Pennsylvania road is now engaged in erecting a large iron viaduct across Ridley creek, 100 ft. high from the water to the rail. The same road is also building an iron bridge on the Frazer branch over Pickering, to replace the old wooden trestle work. These two operations will cost considerably over \$100,000.

The covered bridge built by Troup county, Ga., which was recently burned, will be rebuilt.

An election will be held at Binghamton, New York, October 20 to vote again on the question of constructing a new bridge over the Chenango river at Ferry street; estimated cost, \$50,000. At the election held July 14 to vote on the question of issuing \$65,000 in bonds for this bridge, it was defeated.

It is reported that the Chattanooga & Augusta Railroad Co. will construct a steel viaduct, over which its trains will enter the city when the road is built.

Bids are wanted until October 29 for constructing steel and iron superstructure of Willow street bridge (Cleveland) over old river bed.

It is stated that a new steel bridge about 1,400 ft. long will be built over the Kaskaskia river at Shelbyville, Ill.

The civil engineers of the Boston & Maine railroad are drawing plans for a new steel bridge across the Piscataqua river, which has been talked of for many years.

Iron and Steel.

The Bethlehem and Midvale steel companies will secure the naval contracts for gun forgings after all the delay and question raised regarding the bids of those concerns. Both firms offered to furnish the navy department with a large number of steel forgings intended for the four, five and six inch guns which were to be built for the new ships authorized and for the auxiliary navy. The Bethlehem Company bid 26½ cents per pound for the four and five inch forgings, and Midvale bid 26 cents for the six inch forgings.

President Wm. Chisholm of the Cleveland Rolling Mill Company denies the report of last week that the mills had closed down, throwing 4,500 men out of employment. Instead of it they are working about 2,500 men and are not rolling a ton of iron unless it has been ordered. The mills are not shut down, however, nor will they be.

Consul Germain writes to the department of state from Zurich that American pig iron, steel and tools are wanted in Switzerland. One of the largest houses in Zurich requests him to let American dealers know that it wants 40,000 tons of pig iron for foundry purposes; 55,000 tons of blooms, billets, wire rods, bars and sheets; 3,200 tons of pipes and tubes, and 2,000 tons of hardware goods, chains, bolts, nuts, screws, etc.

The Russian government is stated to be negotiating for the purchase of the machinery of the Wellman Steel Works. The price offered is \$36,175, 90 per cent of which is to be paid in cash as soon as the deal is closed. The purchase includes the engines, the largest train of plate rolls in the world, cranes, pumps, and all necessary apparatus for putting the plant in immediate operation.

Plumb, Burdick & Barnard's nut and bolt works, which have been shut down for some time have started up. Upwards of 400 men went to work.

The bar iron department of the Heimbacher Forge & Rolling Mills, St. Louis, together with the coupling pin and axle department, are being operated single turn.

The Illinois Steel Company has placed an order for 10,000 tons of ore with the Antoine Ore Company which insures the continued activity of that mine.

The Edgar-Thomson works of the Carnegie Steel Company at Bessemer, were closed down this week indefinitely because of lack of orders. The plant has been in

operation making rails for three weeks, but orders were sent out from the general office to shut down.

The Carnegie Steel Company, Ltd., has given notice that the present wage scale will expire Jan. 1. The notice is in accordance with the agreement existing between the employees and the company whereby notice must be given by either the previous October 1 if any change is desired in the wage scale of the following year. It is not known that changes will be made, but the present notice is a necessary form, and the question will be opened for readjustment Jan. 1.

Machinery and Tools.

The Borden & Selleck Co., 48-50 Lake street, Chicago, Ill., reports fairly active business in its coal and ash handling machinery for power houses. The following recent contracts have been put in operation: Ash and soft coal handling conveyors for power house of North Shore Electric Co., Roscoe boulevard and California avenue; also power house of same company at Edgewater; soft coal conveyors, steel storage tanks, etc., for carrying coal from sidetrack through a tunnel under street and factory, delivering same into battery of boilers, for Jas. S. Kirk & Co., soap makers, North Water near Rush street, Chicago. Contract has just been closed with the Chicago Public Library for anthracite coal and ash handling machinery for the new library building. Recent orders have been filed as follows: Tennessee Coal, Iron & Railway Co., Pratt City, Tenn.; Howard-Harrison Coal Co., Bessemer, Ala.; Choctaw Coal Co., Aderson, I. T.; Schloss Iron & Steel Co., Birmingham, Ala.; Toledo Traction Co., Toledo, O.; Elmwood Coal Co., Elmwood, Ill.; Dora Coal & Mining Co., Horse Creek, Ala.; Pablo Gamiz, Havana, Cuba.

The Lodge & Davis Machine Tool Co., Cincinnati, O., reports a general improvement in trade during the past few days. They have received quite a number of orders from various parts of the United States and their foreign business continues good. Inquiries are plentiful and they anticipate a brisk trade immediately after the election.

The Ashton Valve Co., of Boston, has recently established on the upper floor of its works a foundry for the making of all the composition castings used in its large output of valves, gages, etc. Business with this company has continued very good considering the times.

The Lidgerwood Manufacturing Co., 96 Liberty St., New York, has opened a branch office at New Orleans, in the Hennen Building, in charge of Mr. J. H. Dickinson, C.E., a member of the "Hoo-Hoo" society, who has been identified with the manufacture and sale of hoisting and conveying machinery for the past six years. Mr. Dickinson has also gotten out various patent appliances and improvements for logging by steam, and he goes to New Orleans for the purpose of securing the more extensive use of Lidgerwood machinery and improvements for logging.

The Hamilton Machine Tool Co., Hamilton, O., has just completed another large order for drill presses, to be shipped to Stockholm, Sweden.

Recently in an interview Mr. Thos. P. Egan, president of the great woodworking manufacturers, the Egan Co., Cincinnati, O., said: "I don't like to talk politics to business people, but I firmly believe that the free coinage of silver would put me at a disadvantage in the markets of the world. I am after the foreign trade and am getting it, too, but don't send me out with a (silver) spear to fight England with a (gold) needle gun. It gives me no show. I want the Egan Co. to sell woodworking machinery not only to all parts of the United States but also to every country on the globe, and keep our American skilled mechanics employed full time and full wages payable in gold."

Miscellaneous.

The Maritime Canal Co., which proposed to build a canal across Cape Cod, has been authorized by the Massachusetts Railroad Commissioners and Harbor and Land Commissioners, sitting jointly, to issue from time to time the \$6,000,000 of stock and \$6,000,000 of bonds.

The Michigan Peninsular Car Co., last week re-elected old directors and approved annual report.

Andrew Carnegie returned October 9 from his summer vacation in Scotland and England. His unusually early return is attributed to changes in the steel company, John G. A. Leishman having resigned the presidency a few days ago, making it necessary to select a successor as soon as a meeting of all the directors could be called.

The recent building of the Kansas City, Pittsburg & Gulf Railroad into Polk Co., Ark., and a consequent examination by prospectors connected with the railroad of the manganese deposits in this county, have shown that they are more valuable and extensive than heretofore supposed. A report by the state geologist of Arkansas, made 1890, discredits the quantity and quality of these deposits, but a later careful and systematic examination of portions of this district by interested persons lead them to say that instead of the deposits being merely pockets of manganese, beds have been found of the formation, and that veins extending over the country for many miles are traceable by the ordinary prospector; these varying in width from four inches to six feet. Deposits have been found of almost pure mineral, suitable not only for steel making, but for fine glass making also.

The Tyler Car & Lumber Co., of Tyler, Tex., has failed, with liabilities of \$250,000. The assets are unknown.

The Seaboard Air Line has purchased considerable water front at Portsmouth, Va., along the Elizabeth river, which now gives the company about one mile of open water front terminal facilities, and it will erect large warehouses on the newly acquired property at once, covering a front of about 400 ft. and running back over 350 ft.